FEATURE
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Shining net stars emerge from battered industries
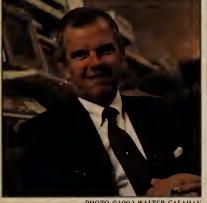
U.S. carmakers and health care providers have been taking their lumps lately.

Domestic carmakers are losing money hand over fist and closing plant after plant. And health care providers have come under the baleful glare of a cost-conscious public concerned about wasteful practices.

But innovation shines even in these beleaguered industries. Ford Motor Co. and the Medical Center of Delaware (MCD) had

8th Annual User Excellence Awards

the courage to take a hard look at their organizations and develop network strategies that would reshape their businesses.

With a nose for mothballing wasteful practices, Ford and MCD went to work applying net technology to streamline operations and improve communications among departments and with business partners.

For their efforts, Ford and MCD have been named cowinners in *Network World's* Eighth Annual User Excellence Awards.

Ford improved communications with its suppliers through a variety of measures, including giving them direct access to its inventory databases. While the automaker is still losing money, its financial picture is improving, thanks, in part, to the savings it has reaped through networking.

MCD replaced outdated information systems with interconnected local-area nets and integrated applications that improved operations and cut costs.
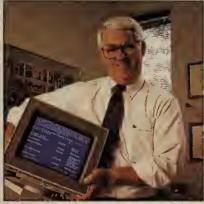

PHOTO ©1992 JON MURESAN
Ford's Joseph Phelan

Eight other organizations earned honorable mention for using networks to meet strategic goals such as improving order entry or protecting their business from disaster. User Excellence stories start on page 30.

The awards will be presented in Washington, D.C. at the opening ceremonies of ComNet '93, which starts Feb. 1. ⚡

PHOTO ©1992 WALTER CALAHAN
MCD's Ward Keever

User Excellence honorable mentions

- ☐ Avon
- ☐ Charles Schwab
- ☐ Complete Health
- ☐ The Foxboro Co.
- ☐ Intermountain Health
- ☐ Northrop Corp.
- ☐ Texas A&M University
- ☐ University of Miami

NatSemi, IBM offer multimedia Ethernet

16M bit/sec local net demonstrated at Comdex/Fall after concept is pitched to IEEE 802.9 committee.

By Joanne Cummings
Senior Writer

LAS VEGAS — National Semiconductor Corp. demonstrated at Comdex/Fall here last week a 16M bit/sec isochronous Ethernet technology it developed with IBM to support real-time interactive applications such as multimedia and videoconferencing.

The new local-area network scheme, called isoENET, uses the same wire and hubs as 10Base-T Ethernet but will require new hub modules and workstation adapter cards based on isochronous chips.

National and IBM have presented the isoENET protocol concept to the IEEE 802.9 standards committee. Apple Computer, Inc. also announced its support for the isoENET concept via a formal statement to the committee.

The 802.9 committee is developing an Integrated Services Local Area Network standard that will integrate circuit-switching technology with current packet-based LANs, such as Ethernet and token ring.

IsoENET is backward-compatible with 10Base-T Ethernet, enabling non-isoENET workstations to seamlessly interact with traditional 10Base-T workstations on
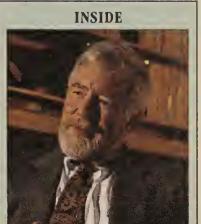
INSIDE

PHOTO ©1992 WALTER CALAHAN
Fannie Mae's Trelegan talks ISDN. Coverage of TRIP '92 begins on page 17.

Court bashes FCC on its tariff rules

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Overturning long-standing FCC rules, a federal court last week ordered AT&T's long-distance rivals to file tariffs for all services, a move that would open custom networks to public scrutiny and give users increased negotiating leverage.

The U.S. Court of Appeals for the District of Columbia Circuit accused the Federal Communications Commission of playing an "administrative law shell game" to protect the rules that it has used for nine years to regulate nondominant carriers.

Unless the order is successfully challenged, all nondominant carriers — including MCI Com-

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NETLINE
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NEW VIRUS THREATENS to lock you out of your Windows applications, researchers say. Page 2.

COMDEX HIGHLIGHTS work group computing, with leading PC software vendors making news. Page 6.

DUO'S NEW SOFTWARE lets host OSI applications access X.25 nets without a FEP. Page 6.

SNAP-IX SOFTWARE gives Unix systems IBM SNA connectivity. Page 6.

IETF EYES FOUR separate alternatives for solving the impending Internet addressing crisis. Page 6.

THE ALLIGATOR emerges from the swamp and snaps at user attempting to install X terminals. Page 63.

NEWSPAPER

100

AT&T weighs alternatives to Accumaster Integrator

By Bob Brown and Jim Duffy
Network World Staff

BRIDGEWATER, N.J. — As it considers pulling its Accumaster Integrator off the market due to slow sales, AT&T is sizing up potential alternatives to the pricey umbrella management system.

The company is currently exploring NCR Corp.'s StarSentry as a replacement for Integrator and is reportedly talking with Hewlett-Packard Co. about the possibility of offering HP's OpenView or an OpenView-based product to users.

Accumaster Integrator debuted in 1989 as a centralized system for consolidating alarms and events from element man-

agement systems.

The latest version of Integrator, Release 3, costs $120,000, which is steep compared to products from competitors, such as HP and Digital Equipment Corp., priced at less than a third of that.

AT&T is not saying it has decided to kill the product, although the company did say it has no plans now to develop Integrator beyond Release 3, which shipped in October.

Uncertainty about Integrator, along with BT's decision not to market its Concert system as a stand-alone product, raises doubts about the "manager-of-managers" approach to net management.

Cabletron sets foundation for broadband networking

Positions next-generation hub; partnership with Fore Systems at center of broadband strategy.

By Skip MacAskill
Staff Writer

ROCHESTER, N.H. — Cabletron Systems, Inc. last week laid out a two-year product plan that calls for the introduction of a high-capacity, next-generation hub and support for a range of new technologies, including Asynchronous Transfer Mode (ATM).

As part of the plan, the company announced an OEM and technology partnership with Fore Systems, Inc., under which the companies will develop ATM interfaces for Cabletron's Multi Media Access Center (MMAC) intel-ligent wiring hub, which supports Ethernet, token ring and Fiber Distributed Data Interface.

In addition to ATM, Cabletron's broadband plan calls for the development of routing, fast-packet switching and dedicated Ethernet capabilities, all of which will be initially integrated into the MMAC but will ultimately form the foundation of Cabletron's next-generation hub.

A direct descendant of the MMAC, the new hub will feature a fault-tolerant, cell-switched scalable architecture that will have a

Researchers uncover first Microsoft Windows virus

Not harmful but may lead to destructive strains.

By Caryn Gillooly
Senior Editor

Just when you thought it was safe to access your Windows applications, industry researchers have discovered the first Microsoft Corp. Windows-specific virus. Called either WinVir14 or Win14, the virus works by locking users out of their Windows applications.

Although experts agree the virus itself is not exceptionally harmful and will not cause loss of data, the mere appearance of the first Windows virus is a major threat to users.

Experts explained that there is now a base upon which more malicious — or less experienced, therefore, more careless — virus authors can build Windows viruses that can cause significant damage not only to individual Windows-based workstations, but also to entire networks of Windows workstations.

The virus Stoned, for example, "is probably the most widely infectious virus of all, but there's nothing destructive about it," said Paul Gates, an official at the National Computer Security Institute. But when researchers dissected the highly destructive Mi-

ATM Forum signaling spec readied for June release

By Ellen Messmer
Senior Correspondent

WASHINGTON, D.C. — The ATM Forum last week announced it will release an Asynchronous Transfer Mode (ATM) signaling specification in April that is designed to enable ATM switches made by different vendors to interoperate.

The forum's switched virtual circuit ATM signaling specification will allow users to mix and match vendor equipment to create local- and wide-area networks capable of supporting permanent as well as switched virtual circuits.

The current ATM specification, released last June, only defined permanent virtual circuits, forcing early implementators that wanted to support switched virtual circuits to use proprietary signaling methods.

At last week's ATM Forum meeting here, George Dobrowski, director of Broadband ISDN Switching Technology at Bell Communications Research, said the new ATM Forum broadband signaling specification will be based on the CCITT draft standard Q.93B.

Like the upcoming CCITT

Briefs

High-priority item. StrataCom, Inc. last week announced an enhancement that prioritizes traffic on frame relay nets. Frame Relay Priority will, for example, allow users to assign priority to IBM Systems Network Architecture traffic in nets where SNA and local-area network traffic share a frame relay port from StrataCom's IPX Fast-Packet switch into the wide-area network. It will be available early next year.

Plugging the leak. Novell, Inc. last week released a NetWare Loadable Module, a new client shell and a set of utilities specifically designed to plug a security hole in the network operating system that was discovered recently by a student at a European university. The tools provide digital signature capabilities that enable NetWare to verify the identity of an end user sending a message or issuing a command. Without the digital signature, it is possible for an unauthorized user employing the program written in the Netherlands to assume the security rights of another user. The security enhancement is available now at no charge by calling (800) 638-9273.

Westinghouse announces net services. Westinghouse Communications, Inc. last week announced it will use Telematics International, Inc.'s packet switches to support its public frame relay service, the rollout of which has been delayed by six months. The carrier also announced plans for a 950 dealer locater service, which will enable a company to offer customers a single number that automatically puts them in touch with its nearest dealer or service office.

Northern Telecom intros wireless switches. Northern Telecom, Inc. last week introduced a low-end wireless telephone system and a wireless switch adjunct for use with any Centrex, private branch exchange or key system. The vendor's Companion 10 is a stand-alone telephone system that can support up to 32 portable telephones, while the Companion 100 adjunct system can support up to 80 portable telephones. Northern Telecom has not yet decided if the stand-alone switch will be sold in the U.S.

Carrier extends frame relay to the Northwest. Performance Systems International, Inc. (PSI) and Diginet Communications, Inc. last week agreed to link their frame relay networks in a move to extend the reach of their frame relay services. PSI will now be able to reach such Pacific Northwest cities as Eugene, Hermiston and Salem, Ore., as well as Olympia, Spokane and Yakima, Wash. Both carriers' services are based on Cascade Communications Corp.'s STDX packet switches.

American Express, MCI launch calling service. American Express Travel Management Service and MCI Communications Corp. last week announced Corporate TeleCard, a service that lets mobile workers use their American Express Corporate Card account numbers to make MCI long-distance calls. With the service, which will be available in the first quarter of 1993, calls will be billed on monthly American Express Corporate Card statements.

CERF's up. The California Education and Research Federation Network (CERFnet), an Internet carrier, last week said it can now provide Switched Multimegabit Data Service (SMDS) over its backbone in a joint effort with Pacific Bell. CERFnet listed Apple Computer, Inc. and Cisco Systems, Inc. as the first customers for the SMDS service.

CONTACTS
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Comdex reflects the rise of work group computing

PC software giants set the tone for giant expo.

By Timothy O'Brien
West Coast Bureau Chief

LAS VEGAS — The huge Comdex/Fall show, long the industry's premier personal computer showcase, this year opened its arms to embrace work group computing and data access in the enterprise.

Major software vendors, such as Microsoft Corp., Borland International, Inc. and Adobe Systems, Inc., used the Comdex stage to introduce products, technologies and strategies for accessing data in multiplatform, multiprotocol network environments.

In his keynote presentation at Comdex, which had an estimated 135,000 attendees and more than 2,000 exhibitors, Borland Chairman and Chief Executive Officer Philippe Kahn said as businesses change and evolve, so must the tools that software vendors provide. Software companies are recognizing the need to divide applications into components that communicate via a messaging or client/server architecture.

Kahn said the shift will lead to the adoption of an object orientation — a development methodology that uses standard, reusable software modules called objects to minimize custom programming.

"The software industry will become more like the semiconductor business, with software factories building various components," Kahn said. "Personal computing changed the way people worked; now object computing will make this power accessible to everyone everywhere."

In a sprawling, village-like complex, Microsoft hosted more than 100 vendors running Windows applications in one of its two gigantic booths on the main floor. Illustrating the new work group focus, one of the sections was dedicated entirely to applications running on Windows for Workgroups.

As expected, Microsoft also announced its long-awaited database product, Access, and a new version of its recently acquired FoxPro database.

Microsoft Chairman Bill Gates said the Windows-based Access will change the way people think about databases since "users will no longer have to choose between ease of use and power."

With Access, users can merge data from a variety of sources and update the results simply by using graphical query-by-example requests. Access applications can include data from a number of popular databases, such as Borland's Paradox and dBase, as well as database servers, such as Digital Equipment Corp.'s Rdb.

Kahn and other Borland executives spent much of the week promoting the company's data access initiative, the Integrated Database Application Programming Interface (IDAPI), along with allies IBM, Novell, Inc. and WordPerfect Corp.

Kahn stressed that Borland was committed to standards and would support further development of the SQL Access Group's Call Level Interface, upon which IDAPI is based. He encouraged Microsoft's participation and said many more vendors would be announcing support of IDAPI in coming weeks.

Another highlight of the show was Adobe's new document communications software — the Acrobat family of products.

Acrobat programs enable fully formatted documents containing distinctive typefaces, color, graphics and photographs to be distributed and viewed in electronic form on different systems over a network.

Based on Adobe's PostScript printing technology, Acrobat lets users print these documents, regardless of the platform or environment in which they were created.

WordPerfect was also working to increase its presence in the work group area by touting its WordPerfect Office 4.0 as one of the first integrated messaging and calendaring software programs able to run on Windows, DOS and Apple Computer, Inc.'s Macintosh. ⊠

McData and Proginet team up to offer OSI alternative

By Michael Cooney
Senior Editor

UNIONDALE, N.Y. — McData Corp. and Proginet Corp. last week announced plans to develop an interface that would let IBM mainframe-based Open Systems Interconnection applications gain access to X.25 nets without using a front-end processor (FEP).

The new software driver interface enables McData's LinkMaster 6200 Network Gateway to be used with Proginet's Host.FTAM product and lets users support file-transfer applications over X.25 nets.

The McData-Proginet combination would offer users a less expensive alternative to IBM's OSI file-transfer product, OSI/File Services (OSI/FS). OSI/FS requires IBM's expensive underlying OSI/Communications Subsystem (OSI/CS) software and the notoriously slow FEP-based NCP Packet Switching Interface/General Access to X.25 Transport Extension (NPSI/GATE) software to connect to X.25 nets. NPSI/GATE translates OSI/CS data into X.25 packets for transmission across X.25 nets.

OSI/CS runs on MVS, VM, OS/400 or OS/2 platforms, implements OSI Layers 3 through 7 and provides links to other OSI nets and services. Together, OSI/FS and OSI/CS can cost more than $330,000 to implement on a large MVS platform.

Proginet's Host.FTAM is mainframe software that lets IBM MVS mainframe users share files with other File Transfer, Access and Management (FTAM)-compliant platforms, without requiring the use of OSI/CS. It is available for $85,000.

In current implementations,

IETF scrutinizes fixes for Internet addressing woes

By Skip MacAskill
Staff Writer

WASHINGTON, D.C. — The Internet Engineering Task Force (IETF) last week met here to scrutinize proposed solutions to the impending crisis in Internet addressing.

With address exhaustion on the Internet expected in the next five years, IETF working groups looked at four different alternatives to Internet Protocol Version 4, the Internet's current addressing scheme protocol.

"This meeting is the beginning of an important process as we struggle to come to terms with the next-generation IP," said Phillip Gross, IETF chairman.

The proposals are the "P" Internet Protocol (PIP), the Transmission Control Protocol/User Datagram Protocol over Connectionless Network Protocol (CLNP), dubbed Tuba, the Simple Internet Protocol (SIP) and IP Address Encapsulation (IPAE).

PIP, which called for a new packet header and routing scheme, was essentially eliminated from consideration during the opening session.

"PIP is not mature enough now and needs a solid year of design implementation before it will be ready," said Paul Tsuchiya, member of the technical staff of the data communications

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Data Connection provides Unix-to-SNA connectivity

By Wayne Eckerson
Senior Editor

LONDON — Data Connection, Ltd. this week will announce software that provides IBM Systems Network Architecture connectivity to stand-alone and networked Unix systems.

Called SNAP-IX, the software provides a robust suite of SNA connectivity options across a range of Unix platforms. It runs on any version of Unix that supports Streams — a standard interprocess communications facility — including IBM's AIX 3.2 and most other Unix systems.

"SNAP-IX gives users the best of two worlds," said Dick Boyle, program director at Gartner Group, Inc. in Stamford, Conn. "It lets users communicate with hosts using SNA interfaces or native Unix. It provides a nice blending of SNA into the Unix world."

SNAP-IX supports IBM's Common Programming Interface for Communications (CPI-C), LU 0, 1, 2, 3 and 6.2, PU 2.1 and Advanced Peer-to-Peer Communications. It also supports 3270 and 3770 emulation as well as the Service Point Command interface for integrating Unix into IBM's NetView network management system.

Phil McConnell, director of Data Connection's SNA Products Business Unit here, said future versions of SNAP-IX will support Advanced Peer-to-Peer Networking.

In a client/server environment, SNAP-IX provides SNA connectivity to OS/2, Unix, Windows and DOS clients attached to a Microsoft Corp. LAN Manager for Unix local-area network. It supports multiple X.25 and Synchronous Data Link Control links to host and peer systems.

SNAP-IX is based on Data Connection's SNA and OSI Portable Software (SNAPS) product, which is sold through many OEMs, including Data General Corp., IBM and NCR Corp.

Data Connection recently licensed SNAP-IX technology to Hewlett-Packard Co., which used it as the basis of its SNAplus product line, released earlier this year.

"Data Connection isn't a Johnny-come-lately; they have been selling products to OEMs for years," Boyle said. "They've got good technology and an excellent support organization, but their challenge is to get their name known."

Available now, SNAP-IX starts at $200,000. ⊠

> **F**uture versions of SNAP-IX will support Advanced Peer-to-Peer Networking.
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Cabletron sets foundation

continued from page 2
life cycle of at least 10 years, according to Mike Skubisz, senior product manager for Cabletron.

The hub will support token-ring, Ethernet, FDDI and 622M bit/sec ATM connectivity, as well as provide LAN server functions, bridging, routing and fast-packet switching capabilities.

Cabletron will also position the device as a broadband gateway to the wide area, with interfaces supporting T-1, fractional T-1, T-3, frame relay, Integrated Services Digital Network Primary Rate Interface, Switched Multimegabit Data Service and Synchronous Optical Network Optical Carrier (OC)-3 and OC-12, which support speeds of 155M and 622M bit/sec, respectively.

The device, which will be managed by the company's Spectrum net management system, will support the new emerging version of the Simple Network Management Protocol, dubbed the Simple Management Protocol, and support fiber, shielded and unshielded twisted-pair connections.

"The hub will provide 2G bit/sec of backplane bandwidth for each module compared to the .5G bit/sec offered today," Skubisz said. "That means if you have a 12-slot enclosure, for example, the user will have 24G bit/sec of available bandwidth."

He added that the hub will offer more than 2M bit/sec of aggregate packet switching performance and complete LAN packet-to-ATM cell conversion, as well.

Progression

The first step in the migration to this new hub, which is expected to be available by the second quarter of 1994, will be technology enhancements for the MMAC that will be rolled out at the NetWorld 93 Boston show in January.

Recognizing that routing will still be an essential part of future broadband networks, Cabletron will develop a routing module for the MMAC that will route traffic between token-ring segments, as well as between Ethernet and FDDI LANs. The device will complement the Cisco Systems, Inc. modules the company currently offers to support Ethernet-to-Ethernet and Ethernet-to-wide-area network routing.

The module will support the Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX), Digital Equipment Corp.'s DECnet, Xerox Corp.'s Xerox Network Systems and IBM's Advanced Peer-to-Peer Networking protocols.

Reacting to growing bandwidth demands and vendors providing platforms that support dedicated Ethernet links, Cabletron said it will offer bridging modules that support what it calls Secure Fast Packet Switching technology.

The bridging modules will each have their own switching engines, enabling users to provide dedicated 10M bit/sec links between end nodes attached to the same module, but the shared-bus architecture of the MMAC prevents that capability from being extended to other modules. The new next-generation hub, however, will include an ATM switching module that will enable users to create dedicated links across the hub.

Cabletron will also support what it calls Full Duplex Switched Ethernet (FDSE). This functionality, which works with the switching engines, will enable Ethernet devices to transmit and receive simultaneously at the full 10M bit/sec Ethernet rate.

Users will initiate FDSE, which will consist of new software for 10Base-T hub modules, by disabling the collision detection and loopback functions.

Integration of FDSE in the MMAC will occur within the next 12 months.

Cabletron will be the first hub maker to go to market with ATM products, based on the rollout plans of its rivals.

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The MMAC's new ATM capabilities will be rolled out at NetWorld. Through its agreement with Fore Systems, Cabletron will provide ATM interfaces from the MMAC to Fore Systems' 16-port ForeRunner ATM switch, as well as resell Fore Systems' adapter cards for high-end workstations from companies such as DEC and Hewlett-Packard Co.

Pricing has not yet been determined, but products are expected to ship by the second quarter of 1993, which would make Cabletron the first hub vendor to go to market with ATM products, based on the rollout plans of its rivals.

"While being the first hub vendor to market with working ATM products doesn't give Cabletron a jump on its competitors, it does give them credibility," said Fred McClimans, an analyst with Gartner Group, Inc., a consultancy in Stamford, Conn. "The other vendors just have a story, but Cabletron has product." **Z**

National, IBM offer Ethernet

continued from page 1
the same net, said Richard Brand, strategic marketing manager for National's LAN Division. Even the maximum node and distance restrictions are the same.

Brand said isoENET adds circuit-switching features to Ethernet, making it possible to support real-time multimedia applications such as videoconferencing. This is achieved by time-stamping data to ensure that it can be transmitted and received in a time-controlled manner, and by utilizing time-division multiplexing at the hub to deliver both 10M bit/sec Ethernet service and circuit-switched service over the same physical interface.

The 16M bit/sec speed was selected because the companies wanted to preserve Ethernet's 10M bit/sec for packet data while adding 1M to 5M bit/sec of bandwidth to support VHS-quality video.

Brand said the scheme is an improvement over recently proposed 100M bit/sec Ethernet technologies, which also purportedly support multimedia, because those schemes deliver packets faster.

"Our research says that won't be the answer," he said. "Faster packets doesn't necessarily mean the data is delivered in the format or time frame required for video."

But according to Al Lill, vice-president of Gartner Group, Inc., a consultancy in Stamford, Conn., both schemes will be able to support multimedia applications in a comparable manner.

"Which scheme you use will depend on your applications," he said. "If you have huge data requirements, such as large CAD/CAM files, you'll go with the 100M bit/sec. If you're looking at just supporting desktop videoconferencing, you'll go with the 16M."

National and IBM decided to concentrate on an isochronous version of Ethernet first.

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Lill said the announcements, coupled with similar technology announced by Starlight Networks, Inc. ("Running multimedia on LANs gets easier," *NW,* Oct. 5), are a good sign for users. "All of the technologies are reliable, and this gives users a choice of low-cost solutions," he said.

Why Ethernet?

National and IBM decided to concentrate on an isochronous version of Ethernet first, rather than IBM's Token Ring, because it was more technically feasible. "Ethernet was an easier implementation initially," Brand said.

But IBM demonstrated a prototype multimedia-enabled Token Ring at the show. The net used unexploited access control mechanisms in Token Ring that enable it to assign a higher priority to multimedia data streams and ensure they are the first to transit the LAN. IBM said it requires new workstation adapters and network control software, but further details were unavailable.

Brand said the National-IBM proposal will be formally proposed at the committee's plenary meeting in March.

According to Brand, IsoENET will complement FDDI-II, an emerging ANSI standard that incorporates both circuit- and packet-switching over fiber at 100M bit/sec. National said it envisions FDDI-II being used as a backbone to support isoENET LANs.

He added that products supporting isoENET will not be available for about a year, but the per-node pricing would be about twice that of 10Base-T. **Z**

Researchers find Windows virus

continued from page 2
chelangelo virus, which destroys hard drives, they said it looked like it was copied directly from Stoned.

"That's the scary part of something like this appearing for the first time," Gates said.

Others agreed. "It's much easier to piggyback off someone else's work than to write your own virus from scratch," said Mitch Zahler, director of personal computer and local-area network security at Productivity Management Group, Inc., a security auditing firm in West Orange, N.J. "Then you have inexperienced programmers dissecting viruses, rewriting them and making them more destructive than they intended."

WinVir14 originated in Scandinavia only a few months ago. It is activated when a user tries to launch an infected Windows application.

The virus denies access to the program and then copies itself to all Windows executable files in that system directory. Access is only denied once. The virus then removes itself from the initially infected application, and the program can be brought up without incident. It sill lurks, however, in the other programs.

The fact that the virus comes and goes so quickly is both good and bad. The good side is, of course, that no data is lost. The bad side is that users might not realize there was a problem, so the virus goes undetected.

According to Gates, this virus is a particular threat to network users. He pointed out that only about half of the viruses that exist today can affect a network server. WinVir14 can easily spread across the network to the server. If, for example, a user's files were infected and the person tried to launch a Windows application on the server, then all Windows executable files in the server directory would be infected. **Z**

ATM Forum spec readied for June

continued from page 2
standard, the forum's specification will call for a signaling channel to support bearer channels, similar to the way Integrated Services Digital Network D channels support ISDN B channels.

The broadband signaling system will support point-to-point connections, as well as service-specific interfaces such as Switched Multimegabit Data Service and frame relay, internetworking functions and multiservice user network interfaces.

In addition, the ATM Forum has added a functionality not included in Q.93B — single point-to-multipoint connections.

"Signaling is very critical," said Glenn Estes, director of ATM technology and applications at Bellcore, who pointed out that the industry needs to back a common ATM signaling method in order for the technology to gain popularity. "It's critical that we get this out immediately so [ATM] can be more useful."

Fred Sammartino, president of the ATM Forum and manager of high-speed networking at Sun Microsystems, Inc., said permanent virtual circuits are "analogous to point-to-point T-1 lines." With switched virtual connections, users will be able to change the topology of their networks, and any user can set up a call to any other user, he said.

Unlike Signaling System 7, which uses a separate signaling network that parallels the traffic-bearing network, the forum's specification calls for the signalling to stay on the same physical wire but on a separate logical path. **Z**

DATA NET ARCHITECTURES

Worth Noting

" As we become wide area in our communications, time becomes the enemy. That's because time is a function of distance. So far, no one has built a warp drive for data."

Cleve Graves
Technical marketing manager
OpenConnect Systems, Inc.
Dallas

Data Packets

McDATA Corp. of Broomfield, Colo., last week announced an Enterprise System Connection (ESCON) protocol analyzer. The LinkMaster 9100 ChannelScope captures, stores and reports frame-level data traffic between any two ESCON I/O channels. ESCON is IBM's high-speed fiber-optic channel technology.

The ChannelScope is personal computer software and boards that can be configured with a 2,400-baud modem, enabling it to report channel activity from an unattended remote sight.

The ChannelScope software and boards fit in any Industry Standard Architecture PC and cost $35,900.

Data Products International, Inc. (DPI) of Phoenix, Ariz., last week became the first firm to be licensed to resell IBM's 6611 Network Processor. Via an OEM agreement, DPI will offer under its own name the 6611 Models 170 and 240. The firm also said it will resell IBM's 3172 Interconnect Controller.

DPI is a member of, and communications equipment supplier to, the MDS Group, a network and systems integration company in Switzerland.

Pricing and availability date were unavailable. ⊏

UDS Motorola takes wraps off asynch DSUs for PCs

'Digital modems' don't need special hardware.

By Jim Duffy
Senior Editor

HUNTSVILLE, Ala. — UDS Motorola recently unveiled three asynchronous data service unit/channel service units for personal computers that use the same communications software as dial-up modems.

The new devices, which UDS calls digital modems, are designed to enable PCs to support switched 56K bit/sec services using asynchronous communication ports instead of serial interface hardware as required with synchronous DSU/CSUs.

They include the DU170 F/R, a two-wire device that is compatible with Northern Telecom, Inc.'s Datapath technology used by many carriers; SW56II F/R, a four-wire device for use with AT&T's Accunet Switched 56 service; and the TA120 F/R, for use with Integrated Services Digital

Network Basic Rate Interface service.

The devices are adaptations of UDS' standard DSU/CSUs, the company said. Instead of transmitting data synchronously, like DSU/CSUs do, the so-called digital modems transmit data asynchronously. This allows customers to use the same communications software they do with modems and avoid using special hardware.

Digital phone service

"What we're trying to do is make this technology compatible with the installed base of PCs out there, which are primarily asynchronous," said Bill Schlosser, strategic analyst at UDS Motorola. "The only difference is that you have to have the digital telephone service."

Companies are increasingly

Metacomp system forges link to Sun workstations

By Jim Duffy
Senior Editor

SAN DIEGO — Metacomp, Inc. last week introduced a communications hardware subsystem for Sun Microsystems, Inc. SPARCstations that allows users to connect the workstations to modem pools and storage and print devices.

The subsystem, called S-Bus Connect, comprises an S-Bus host adapter board and a 16- by 16-in. pizza box-sized subsystem chassis, which provides 32 asynchronous ports, two parallel printer ports and space for two 5¼-in. Small Computer System Interface (SCSI) peripherals. The host adapter board resides in the SPARCstation, occupying one card slot, and the subsystem chassis is connected via cabling.

The S-Bus Connect can be used as a multiuser communications, disk and print server, and as a platform for data collection and telecommunications processing.

With the asynchronous ports, users can simultaneously connect 32 asynchronous terminals to a SPARCstation, transforming
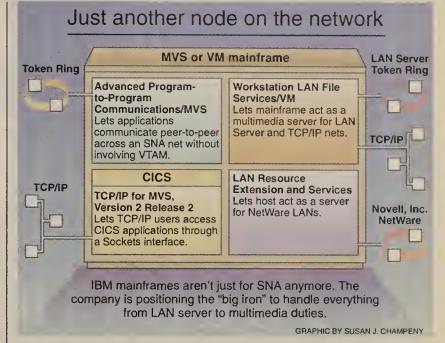
the workstation into a terminal server. Users can also connect a maximum of 32 modems to the ports and configure the S-Bus Connect subsystem into a modem pool for SPARCstations.

The modems can operate at 38.4K bit/sec full-duplex, Metacomp said.

Two full-height, 5¼-in. peripherals can connect to the SCSI ports and be housed inside the chassis. These SCSI peripherals can be any combination of disk, tape or CDROM drives, or other devices.

Factory automation and financial trading are two markets where users quickly run out of connectivity capacity for their SPARCstations, according to the company. Transferring huge data files — a common practice in both markets — quickly uses up disk space. Moreover, if those files stay stored on a SPARCstation, many users will have access to them.

The S-Bus Connect is priced at $3,295. It operates with SPARCstations running Sun OS 4.1.3 and Solaris 2.0. ⊏

Just another node on the network

IBM mainframes aren't just for SNA anymore. The company is positioning the "big iron" to handle everything from LAN server to multimedia duties.

GRAPHIC BY SUSAN J. CHAMPENY

IBM mainframe role continues to evolve

Big Blue proceeds with client/server but keeps the 'big iron' a mainstay of its new products.

By Michael Cooney
Senior Editor

With the announcements two weeks ago of software that turns VM hosts into LAN multimedia file servers, IBM continued its drive to mold its "big iron" into client/server networking shape.

That announcement, coupled with others earlier this year, is intended to let users integrate mainframes into emerging client/server environments while letting IBM continue to wring more life out of its bread-and-butter product line.

Analysts generally applauded the moves, saying that making existing mainframes useful in the client/server arena will save application development money as well as let users take advantage of existing networking structures. However, on the down side, many older applications may not be ported to a client/server arrangement.

Whether IBM can persuade users to keep their mainframes in a client/server network remains to be seen, but it will not be for the lack of trying.

IBM has made at least three major mainframe client/server product rollouts this year that make the mainframe just another node on the network, rather than the traditional hierarchical master it has played in Systems Network Architecture nets in the past.

The latest round of announce-

ments included the release of a new version of the company's client/server-based Workstation LAN File Services/VM. The software turns VM hosts into multimedia file servers for local-area networks running the company's OS/2 LAN Server or Transmission Control Protocol/Internet Protocol ("Multimedia storm to sweep over Las Vegas," *NW*, Nov. 16). An MVS version is expected in the future.

MVS connection

The other major mainframe-related client/server announcements involved the largest IBM mainframe operating system, MVS. The newly announced MVS/ESA Version 4 Release 3 contains a new version of the Advanced Program-to-Program Communications/MVS.

APPC/MVS is IBM's strategic MVS application development subsystem that is designed to make the mainframe a true application server.

APPC/MVS supports APPC server facilities that provide a set of APPC verbs that users and software developers can use to create cooperative processing applications capable of communicating peer-to-peer across an SNA net without having to involve VTAM to set up sessions ("IBM targets host in client/server push," *NW*, June 22).

This version also received a

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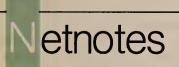
Lotus Notes Document Imaging

As many as 80% of all personal computers are expected to be networked by 1998, as opposed to the 35% networked today, according to a study by Market Intelligence Research Corp., based in Mountain View, Calif.

Netnotes

Are you locked out of your Novell, Inc. NetWare 3.11 environment? Has the supervisor left the company without leaving the supervisor password behind? **AccessData Corp.**, based in Orem, Utah, has a solution.

AccessData has brought out a product called NTpass, a NetWare password recovery program that lets the user change any password, including the supervisor password, without knowledge of any previously existing passwords.

NTpass is a NetWare Loadable Module that, for security reasons, can only be loaded at the file server; it will not function on any other node on the network.

Since the product could pose serious security risks, other measures have been taken to ensure it is not used incorrectly. For example, to run NTpass, a specific access code must be entered. Since the product ships without this access code, the user would have to call the company to get it.

The company also requires that users register the program with AccessData before the access code is issued. In addition, each access code is a derivative of the NTpass serial number and NetWare serial number, preventing the duplication of access codes.

NTpass is available now for $295. For more information, call AccessData at (801) 224-6970. ▣

Firm to deliver mapping, SNMP mgmt. tool for Mac

Takes advantage of Apple's new SNMP support.

By Caryn Gillooly
Senior Editor

LAFAYETTE, Calif. — Neon Software, Inc. plans to bring out by early next year an SNMP-based mapping and management tool for Apple Computer, Inc. Apple-Talk nets.

The new software, called LANsurveyor, will graphically depict AppleTalk networks and devices while providing real-time troubleshooting and monitoring capabilities using Apple's new Simple Network Management Protocol agent for the Macintosh.

Residing on a Macintosh on the network, LANsurveyor will automatically discover all network objects — including end nodes and internetworking devices such as routers — as well as the connections between them.

According to Neon, based here, although there are other products available that can provide these capabilities, LANsurveyor will also provide a logical network representation. For example, the net administrator will be able to see specific zones and separate departments on the same network.

The administrator will also be able to customize the mapping feature to, for example, display only network routers or launch management applications from specified icons.

SNMP management

LANsurveyor will be one of the first products to take advantage of Apple's SNMP support. At INTEROP 92 Fall late last month, Apple announced it will include an SNMP agent in its AppleTalk Connection for Macintosh and TCP/IP Connection for Macintosh products.

With Apple's SNMP support, LANsurveyor will be able to poll Macintosh clients to receive basic traffic, status and configuration data from each node. LANsurveyor will also be able to collect SNMP information from routers and file servers on AppleTalk networks and integrate that information with the individual node information to create network reports.

LANsurveyor will be available early next year in two versions — one for a limited number of zones that can be mapped and monitored simultaneously and one for an unlimited number of zones. They will be priced at $395 and $695, respectively. ▣

Vendor releases line of low-end Ethernet products

LAS VEGAS — Kingston Technology Corp. last week at Comdex/Fall here released the EtheRx line of Ethernet network interface cards and 10Base-T concentrators.

The new EtheRx Network Interface Card (NIC) is based on technology from Advanced Micro Devices, Inc. It is an Industry Standard Architecture (ISA) card with bus mastering capabilities that, according to the company, help boost performance by as much as 30% over non-bus-mastering cards.

The EtheRx NIC is compatible with Microsoft Corp.'s new Workgroup for Windows product, as well as Microsoft's LAN Manager, Novell, Inc.'s NetWare, Artisoft, Inc.'s LANtastic and other network operating systems.

The new EtheRx Multi-Port 10Base-T Concentrator has eight 10Base-T ports and a single attachment unit interface, according to the company, which is based in Fountain Valley, Calif. It can be used as a stand-alone device for small networks or daisy-chained for larger ones.

Future products in the EtheRx line will include an external LAN adapter, PCMCIA cards, a Fiber Distributed Data Interface for the concentrator and additional concentrator capabilities. The company also plans to bring out a line of bridges and routers as well as a full range of token-ring products.

Both products are available now. The EtheRx NIC costs $119, while the EtheRx Concentrator costs $429. ▣

RAID 5 helps keep nets fault-tolerant

With RAID 5, the above CAT or DOG file is not only completely intact in a single disk, but it is also distributed across the disk array in such a way that if a disk fails, the file can still be recompiled and accessed as if no failure occurred.

GRAPHIC BY SUSAN J. CHAMPENY   SOURCE: MICROPOLIS CORP., CHATSWORTH, CALIF.

Publisher gains fault tolerance with RAID

Publishing house protects net with RAID Level 5, so if one drive fails, data saved on another.

By Caryn Gillooly
Senior Editor

You don't have to have a mainframe or even a 1,000-node local-area network to need fault tolerance.

So says Dan Strohl, manager of information systems at Legal Communications, Ltd., a Philadelphia-based publisher of legal newspapers, journals and other publications.

Legal Communications is running Novell, Inc. NetWare 3.11 on a coaxial Ethernet backbone that supports six specialized servers — a bulletin board server, an MHS mail server, a print server, a wire-service server, a modem server and the file server — and a minicomputer with about 10 attached terminals.

About 40 personal computers, as well as three Apple Computer, Inc. Macintoshes running AppleTalk, are linked to the file server via two 10Base-T Ethernet hubs. The Macintoshes are used in the production department, while the PCs are used for accounting, circulation, marketing, editorial and administration.

The company uses the network to publish daily, weekly and quarterly newspapers and magazines, in addition to providing the local legal community with information directories, such as a list of all the lawyers in the Philadelphia area. According to Strohl, the company is also looking into offering on-line services and may soon be implementing imaging applications.

Although the network is not gigantic, it is critical to business. Strohl said the company needs fault tolerance to minimize network failures and, if they occur, to ensure that employees do not lose data.

"Unlike a lot of other companies, we don't pass a lot of data back and forth; about one-third of the folks on the network use it as a hard drive," Strohl said, stressing the importance of backup and storage for their particular applications.

Unforgiving clientele

"Not every company needs fault tolerance, but if our network goes down for one day, we'd be back to typing on typewriters and hand typesetting," Strohl said. "And, we're working with lawyers that are not very forgiving; it's possible that if we lost the network for one day, we'd be out of business the next."

Strohl pointed out that the company does not need the kind of fault tolerance provided by Novell's System Fault Tolerance Level III, wherein two mirrored servers safeguard against server failure.

However, time and data recovery are important in ensuring the company's daily papers get out the door.

"If our network goes down, I've got an hour or two to have it up again for us to still be in business," he said. "But if one of our drives goes down, I have to be *(continued on page 12)*

Publisher gains fault tolerance with RAID

able to replace it immediately."

To satisfy its fault-tolerance needs, Legal Communications has implemented Micropolis Corp.'s Raidion Redundant Array of Inexpensive Disks (RAID) system. The system attaches directly to the NetWare 3.11 server as a Small Computer System Interface (SCSI) disk device.

Raidion provides up to 54G bytes of on-line storage on a maximum of 32 SCSI drives and the software to distribute files redundantly across those drives. If one of the drives fails, all of the data remains intact on the other drives.

Three-disk system

Legal Communications has implemented a three-disk system providing 1.3G bytes of RAID Level 5 capabilities. Its system is also hot-swappable, meaning Strohl can replace or add new disks without having to bring down the entire system.

In addition, once the new disks are added, the system automatically configures itself, duplicating the data where necessary.

"With the RAID array, if any one drive fails, the users on the network wouldn't even notice," Strohl said. "That's what I call fault tolerance."

Before the RAID system, Legal Communications used a duplexed drive array. This meant all data was mirrored from one drive to another. But, according to Strohl, having duplexed drives was forcing the company to spend extra money needlessly.

"With duplexing, if I wanted to add another 300M bytes [to the duplexed system], I would have to buy 600M [bytes]," Strohl said, because the information would need to be mirrored across two identical-size disks. "If I wanted to buy 10G bytes, I'd have to buy 20G bytes."

With RAID, he said, the more you buy, the more you save.

"Every time I need to add another gigabyte, I'll save $1,000," Strohl said. "That's important because we're just starting to get into imaging, where storage space will be at a premium." ⊐

UDS Motorola takes wraps off DSUs

turning to switched digital lines to link remote branch offices to corporate computing resources, Schlosser said.

They need the higher throughput and reliability that digital lines offer for dialing into and transferring files with remote local-area networks. Also, tariffs for digital services have been falling, making the lines more affordable.

The cost of the devices, however, may be a stumbling block. The DU170 F/R costs $1,250, the SW56II F/R is priced at $1,150, and the TA120 F/R is tagged at $1,395. All are available now.

"If you are using a V.32bis at 14.4K bit/sec and doing compression, or a proprietary V.fast modem with compression,

> **W**ith analog devices at bargain basement prices, speed alone won't entice users to migrate en masse to digital devices, Curtis Price said.
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> ▲▲▲
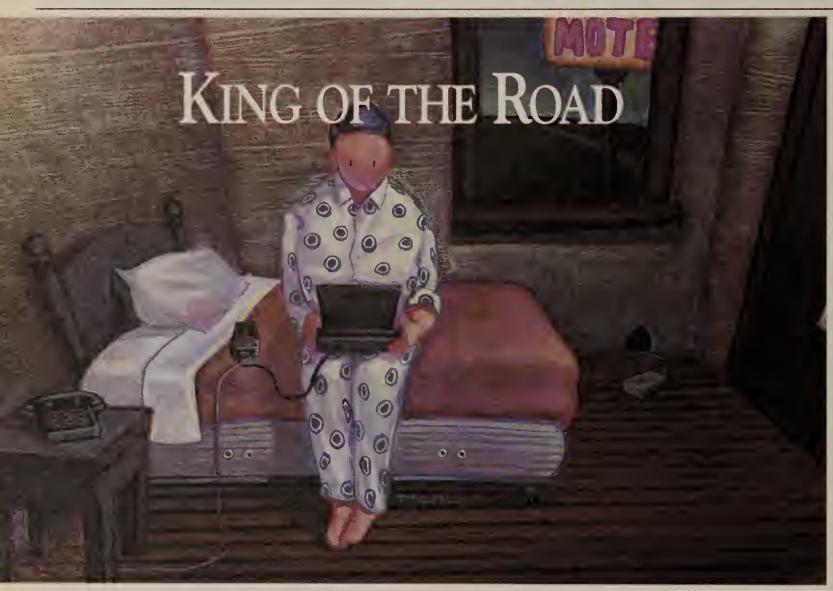
you're getting comparable throughput for a lot less," said analyst Curtis Price of International Data Corp. in Framingham, Mass. V.fast is a pending CCITT standard for 28.8K bit/sec dial-up modems.

But UDS claims that dial-up modem throughput tops out at about 30K bit/sec due to the error detection and correction required. It also says that, even though the asynchronous DSUs cost about 50% more than analog modems, they operate about 400% faster than 9.6K bit/sec devices.

The faster the transmission rate, the less time and money spent maintaining the link, meaning the devices offer a better price per bit than modems, according to UDS.

But with analog devices at bargain basement prices, Price said speed alone won't entice users to migrate en masse to the digital devices.

In addition to switched 56K bit/sec services delivered from AT&T and Northern Telecom switches, the asynchronous DSUs support dial-up frame relay service when connected to a Northern Telecom DMS-100 central office switch equipped with a DataSPAN frame relay module. ⊐

INTERNETWORKS

LAN-TO-LAN AND LAN-TO-WAN EQUIPMENT AND STRATEGIES

Link Notes

Netronix, Inc. last week announced it has joined the Open Shortest Path First (OSPF) Interoperability Group. The bridge/router vendor, which said it will feature OSPF in its products by the first quarter of 1993, will work with the consortium's Technical Working Group, which addresses OSPF protocol implementation and migration issues.

The OSPF Interoperability Group was formed last spring to foster interoperability among internet vendors' OSPF implementations and includes vendors, users and testing labs.

Combinet demonstrated at the first Transcontinental ISDN Project '92 (TRIP '92) last week its Interchange ISDN LAN Adapter, a bridge that supports Integrated Services Digital Network links. Applications demonstrated included medical imaging, distance learning, telecommuting, CDROM library access and LAN bridging.

For more information, contact Combinet at (408) 522-9020.

Asante Technologies, Inc., a vendor of entry-level wiring hubs and Ethernet adapter cards, this week will launch a certified network integrator program designed to support the company's expansion into the higher end inter-

FDDI-to-FDDI

Company Product	Forwarding rate	IP routing 64-byte packets	IP routing 2,049-byte packets	Bridging 64-byte packets	Bridging 2,048-byte packets
Test devices	76% on 64 bytes 96% on 2,048 bytes	139,535	5,931	139,535	5,931
Cisco Systems, Inc. AGS+ bridge/router	Packet/sec Throughput	72,200 3%	5,931 97%	20,796 6%	5,931 97%
Coral Network Corp. CX 1600 bridge/router	Packet/sec Throughput	27,800 15%	2,967 49%	139,535 76%	5,931 100%
Digital Equipment Corp. DECNIS 600 bridge/router	Packet/sec Throughput	56,869 16%	4,352 76%	— —	— —
Sun Microsystems, Inc. FDDI/2 SS2	Packet/sec Throughput	5,398 3%	2,965 56%	— —	— —
3Com Corp. NetBuilder II bridge/router	Packet/sec Throughput	35,514 17%	4,720 87%	47,709 18%	1,542 87%
Wellfleet Communications, Inc. Backbone Node bridge/router	Packet/sec Throughput	72,893 4%	4,959 82%	86,852 6%	4,802 82%

* Throughput indicates actual packet throughput of FDDI's theoretical maximum of 180,000 packet/sec.

SOURCE: HARVARD UNIVERSITY, CAMBRIDGE, MASS.

AppleTalk internet router supports digital WAN links

Inverse mux doubles throughput between sites.

By Maureen Molloy
Senior Writer

APTOS, Calif — Engage Communication, Inc. last week announced a router for Apple Computer, Inc. Macintoshes that supports digital wide-area network links at speeds up to 2M bit/sec.

ExpressRouter can be configured with as many as four ports and uses either switched or dedicated digital links to connect Ethernet or LocalTalk local-area networks to a central site. It is designed for users that transfer large data files between remote sites or establish a WAN for periodic sharing of data, applications and other net resources.

The router is compatible with standard digital dial-up services, such as switched 56, Integrated Services Digital Network and T-1. The company claims that the use of these facilities can be comparably priced with analog telephone lines because the higher speed trims the amount of time required to maintain the link.

The ExpressRouter is equipped with EngageView software for remote maintenance and configuration, password protection for network dial-in security, and a selection of RS-232, RS-449 and V.35 ports.

The company offers an inverse multiplexing option that doubles the throughput between sites by splitting a data stream for transmission across two ports.

According to Mark Doyle, president of Engage, the inverse multiplexing option can cut file transfer times as much as fourteenfold by using digital dial-up services at speeds up to 256K bit/sec.

Additionally, the ExpressRouter can be equipped with an internal 56K bit/sec data service

ExpressRouter uses switched or dedicated digital links to connect LANs to a central site.

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unit/channel service unit for direct access to four-wire dedicated digital service.

A third optional feature for the ExpressRouter includes zone cloaking, which bolsters security by making selected AppleTalk zones invisible on the network.

A one-port ExpressRouter costs $1,995 and is available now.

Additional ports cost $500 each, as does the inverse multiplexing option. ▧

Router vendors take Harvard midterms

University's test lab gives bridge/routers high marks for performance across various LANs.

By Maureen Molloy
Senior Writer

CAMBRIDGE, Mass. — Bridge/routers are getting faster and more reliable with each passing year, according to tests conducted at Harvard University's Network Test Device Lab.

Several of the dozen vendors that participated in the tests have products that can forward packets at speeds of more than 80,000 packet/sec. The threshold in Harvard's tests last year was about 64,000 packet/sec. In addition, most of the lower end two- and four-port devices were able to sustain throughput at the maximum speed supported by the attached local-area networks.

Harvard consultant Scott Bradner said the increase in speed reflects the evolving requirements put on these devices, such as in collapsed backbone applications, where the router's backplane is used as a network backbone. Bradner, who also chairs the Internet Engineering Task Force's (IETF) Benchmarking Methodology Working Group, conducted the tests earlier this fall. The annual examination is intended to give users an impartial source of information on the performance of internetworking devices.

Multiple tests were conducted to determine how well each bridge/router fared when sending data packets across various types of LANs. One measured how well routers performed when passing data between two local Fiber Distributed Data Interface LANs (see graphic, this page).

In the Ethernet and token-ring tests, performance was gauged between two local LANs as well as between two LANs linked via a wide-area interface (see graphic, page 16).

Every device in all of the tests was tested using Transmission Control Protocol/Internet Protocol routing and transparent bridging. The source route bridging algorithm was also included in tests performed on token-ring LANs.

Bradner said several new benchmarks were used this year

to reflect real-world capabilities more accurately.

For instance, rather than simply passing data packets between adjacent nets in the simulated test environment, Bradner employed the Routing Information Protocol to determine how well a device performed routing while accommodating packets containing routing update information.

In addition, Bradner measured performance in some tests

Most of the lower end devices were able to sustain throughput at the maximum speed supported by the attached networks.

▲▲▲

using a rated throughput benchmark, instead of a router's maximum load potential.

Rated throughput refers to values as defined in the IETF's Request For Comment 1242. It is considered a more rigorous test criterion because it illustrates the number of packets per second a router can actually handle without dropping a single packet.
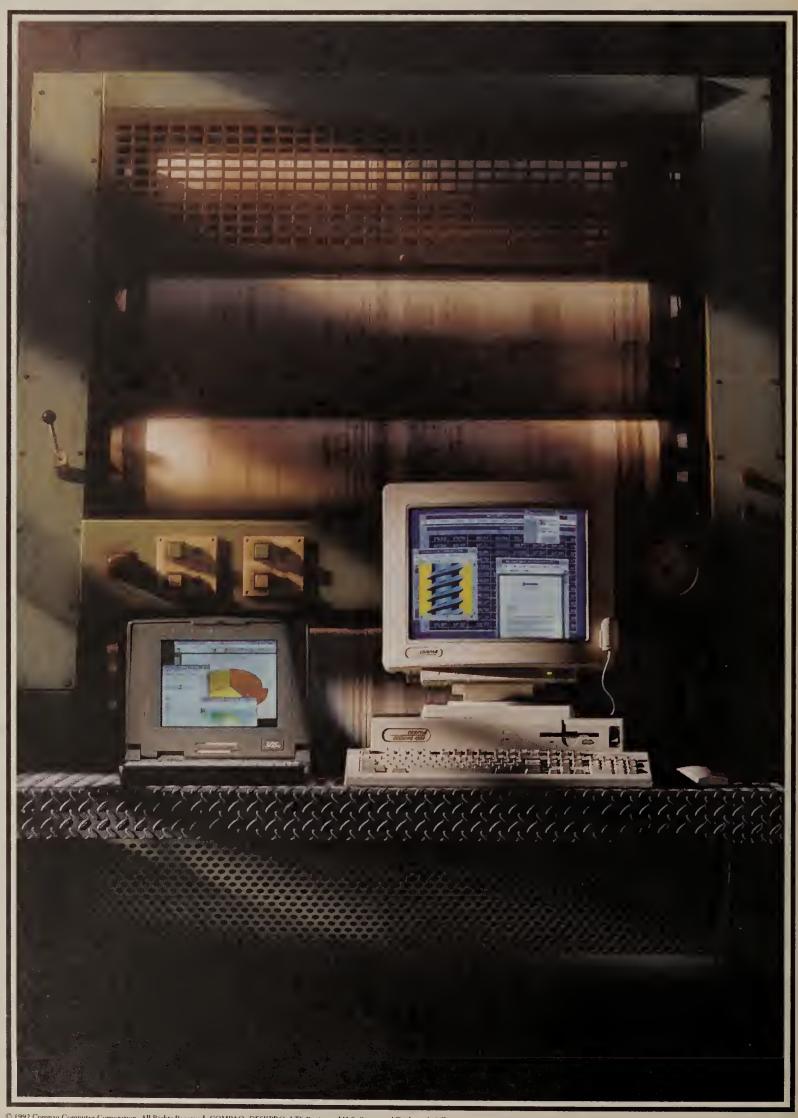
Maximum load, on the other hand, shows the number of packets a router can pass per second when fed packets at wire speed. This typically results in a high number but does not show how many packets are dropped; actual performance is much less.

In the local FDDI test, for instance, most of the devices under examination were able to forward packets at very high speeds when packet loss was not taken into account. For instance, Cisco Systems, Inc.'s AGS+ had a packet forwarding rate of 72,200 packet/sec when passing 64-byte packets.

But because of retransmissions due to packet loss, the router's packet throughput rate was

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"Compaq hit the mark with 14 machines that combined low price with high performance and a most-wanted list of features."
—InfoWorld, June 22, 1992

"…Compaq has slashed prices without compromising quality."
—PC Week, June 22, 1992

"Compaq Computer Corporation has taken an aggressive pricing stance with its new ProSignia server line."
—PC Week, October 5, 1992

"Despite its low price, the ProSignia packs a variety of features."
—PC Week, October 5, 1992

"…For running Windows on the road, the Compaq LTE Lite/25c is clearly the best notebook yet."
—PC Laptop, October 1992

"It is the best-looking color screen on any notebook, plain and simple."
—PC Computing, August 1992

"DeskPro/i…combines the traditional Compaq virtues of strong performance and technical innovation with aggressive pricing."
—PC Week, June 22, 1992

"Make no mistake about it: this is a strikingly energetic Compaq."
—PC Week, June 22, 1992

"You'd expect technical leadership from Compaq, but the Lite/25c's aggressive price took us completely by surprise."
—PC Computing, August 1992

"Low-cost ProLinea offers solid quality."
—InfoWorld, October 5, 1992

"…Compaq Contura 3/25 notebook is part of Compaq's clone-beater strategy and packs an aggressive price/performance punch…"
—PC Magazine, August 1992

"That's leadership."
—PC Week, June 22, 1992

intel inside TM

Our alliance with Intel enables us to improve on processor technologies with such advances as easy-to-upgrade architectures and sophisticated power-conservation features.

Compaq engineers have already been improving our new affordable PCs. In fact, the COMPAQ Contura PC is now available with a super-crisp, passive-matrix VGA color screen.

COMPAQ

Bridges/routers take Harvard exams

Company	Product	Ethernet to Ethernet via T-1 WAN				Local Ethernet 2- to 4-port routing devices				Local Ethernet with more than 4-port devices				Token ring to token ring via T-1 WAN				Local 2-port token ring			
		IP 64 bytes	IP 1,518 bytes	Bridge 64 bytes	Bridge 1,518 bytes	IP 64 bytes	IP 1,518 bytes	Bridge 64 bytes	Bridge 1,518 bytes	IP 64 bytes	IP 1,518 bytes	Bridge 64 bytes	Bridge 1,518 bytes	IP 64 bytes	IP 2,048 bytes	SRB 64 bytes	SRB 2,048 bytes	IP 64 bytes	IP 2,048 bytes	SRB 64 bytes	SRB 2,048 bytes
	Tester packet/sec	2,976	164	2,976	164	14,880	812	14,880	812	14,880	812	14,880	812	3,123	99	3,123	99	14,725	943	14,625	943
Advanced Computer Communications	ACS 4200 bridge/router					4,735	808	4,983	807					2,603	99	2,603	90	2,313	747	2,603	743
Alantec	PowerHub									14,878	811	14,879	811								
BBN Communications	T20					5,690	811														
Chipcom Corp.	Router module					4,813	811	5,106	811												
Cisco Systems, Inc.	AGS+ bridge/router	2,975	106	2,417	105					14,268	811	13,986	811	3,123	90	2,231	90	14,625	943	14,625	943
Clearpoint Research Corp.	Pixis bridge					14,332	811	14,879	811												
Coral Network Corp.	CX 1600 bridge/router									13,424	808	13,560	808								
Datability, Inc.	DXA 550					14,332	811	14,879	811												
Digital Equipment Corp.	DECNIS 600 bridge/router	2,478	105							13,362	812	13,950	810								
Hewlett-Packard Co.	27285 bridge/router	2,975	106	1,645	105	7,010	799	7,732	800												
IBM	6611 Network Processor bridge/router									3,974	810							3,733	943	3,364	943
Network Application Technology	LANB/280 bridge/router	2,478	110																		
Network Systems Corp./Vitalink Communications Corp.	6600 bridge/router	2,975	106	2,448		13,922	810	13,917	810												
Novell, Inc.	Multiprotocol Router					9,062	711											11,433	943		
Penril DataComm Networks, Inc.	Series 2000 bridge/router					14,876	811	14,878	811												
Proteon, Inc.	DNX 300 bridge/router	2,301	105	1,797	103	3,976	804	3,995	802					2,230	90	1,870	90				
	CNX 500 bridge/router*	3,271	107							12,802	806	12,443	806	2,603	83	1,952	79	14,625	943	14,775	943
3Com Corp.	NetBuilder II bridge/router									14,812	811	14,843	811								
Wellfleet Communications, Inc.	Backbone Node bridge/router									13,394	811	14,843	811								
Xyplex, Inc.	Network 9000 intranetworking hub	2,974	102	2,571	105	12,798	805	14,479	805												

* Testing done on different device

SRB = Source route bridging

SOURCE: HARVARD UNIVERSITY, CAMBRIDGE, MASS.

Router vendors take midterms

only 5,400 packet/sec, 3% of FDDI's theoretical maximum capacity of 180,000 packet/sec for 64-byte packets.

The throughput of the Cisco device jumped up to 97%, however, when 2K-byte packets were used. This was because the packet forwarding rate of 5,931 packet/sec closely matched the router's true throughput capacity.

Bradner said several vendors showed particularly impressive results in all the tests, including perennial router stalwarts Cisco and Wellfleet Communications, Inc., as well as Digital Equipment Corp. and relative newcomer Coral Network Corp.

In the local token-ring test, Cisco and Proteon, Inc. both gave stellar performances. Each was able to forward packets at more than 14,000 packet/sec and perform source route bridging at about the same rate.

Bradner said both vendors' gear was limited by the test unit, not by the internal architecture of their respective devices. ⚡

Link Notes

networking equipment market next year.

Under the program, Asante will work with its distributors to identify and train network and system integrators to install and support the new offerings. Integrators could include existing Asante partners such as Electronic Data Systems Corp.

"We want to make it as easy as possible for integrators to install and support all of our products," said Ron Volkmar, vice-president of sales at Asante.

The company's new internetworking gear, which is due out in the second quarter of 1993, will include a hub offering more functionality and capacity than the company's current 12-port offerings. Further details were not available.

The certified integrator program will not only include train-ing, but will also involve product development, Volkmar said.

Asante hopes to certify about 50 integrators in the next 60 to 90 days, Volkmar said.

Intellicom, Inc. announced a new version of its 6-port 10Base-T Hub Card that is equipped with the vendor's new Simple Network Management Protocol-based Quick-Link for Windows. The software enables users of MS-DOS- and Windows-based microcomputers to establish multiple simultaneous application sessions to any file server. The TP-426/QL lets users achieve interoperability across various systems, such as LAN Manager, NetWare, Network Basic I/O System or Digital Equipment Corp. Pathworks, with a single physical connection.

The TP-426/QL card costs $534 and is available now. For more information, contact Intellicom at (818) 407-3900. ⚡

Mainframe continues to evolve

new release of TCP/IP for MVS. Version 2 Release 2 of TCP/IP for MVS features a TCP/IP Sockets interface to CICS applications on the mainframe.

The Sockets interface will give TCP/IP net users direct access to CICS applications on SNA-based hosts. CICS Sockets applications can operate as clients of or servers to other applications written to Sockets and residing on a TCP/IP net.

The new products join IBM's first mainframe client/server product, LAN Resource Extension and Services (LANRES). LANRES is mainframe software that lets MVS or VM mainframes act as a server of servers for mainframe channel-attached Novell, Inc. NetWare networks.

In addition, IBM emphasized the mainframe's emerging server role at last week's Comdex/Fall show by setting up an ES/9000 mainframe to act as a server to multiple client demonstrations being conducted inside its booth.

"We want to implement client/server applications on the mainframe that can handle high-speed, large-scale file services to clients dispersed geographically," said Linda Sanford, IBM Enterprise Systems' director of systems and programming business strategy.

Mainframe pros

The mainframe has at least three basic things going for it in a client/server environment, San-ford said. It has a large capacity for storage, which lets it be used effectively as a file server. Also, it supports a wide variety of connectivity options, from SNA and TCP/IP to Open Systems Interconnection, and users can manage their entire enterprise from a central mainframe.

For many companies already married to the mainframe, it makes sense to at least look at using available mainframe cycles for file serving, analysts said. If a user has a mainframe and a staff of developers, it is a reliable way to go.

"Applications that require lots of bandwidth make the mainframe indispensable," said C.J. Combs, a network analyst with Pacific Bell based in Hayward, Calif.

The company has an extensive TCP/IP net and is exploring the idea of moving its mainframe onto the net as a server.

One of the company's major concerns about using the mainframe as a server is that its large applications create a need for higher WAN bandwidth.

"The larger applications on the mainframe generate larger amounts of traffic on the wide area, so we'll have to increase line capabilities, but it's an issue that's a couple years away," Combs said.

Another issue is that many emerging client/server databases are incompatible with the mainframe environment. Tech-nology for setting up distributed databases with the mainframe are not in place yet, according to analysts.

"Most MVS mainframes are still batch-oriented and not interactive enough for the client/server world," said John Holcomb, product development manager for VM application developers at VM Systems Group, Inc. in Vienna, Va.

Not every mainframe makes a cost-effective LAN server anyway, Holcomb said. High-end mainframes have a high cost-per-million instructions per second ratio and require larger staffs. So low-end mainframes, like VM systems, could make the best or, at least, most likely servers, he added.

"The mainframe is such a cumbersome beast that it will take time for IBM and its users to come to terms with it as a server," said Frank Dzubeck, president of the Communications Network Architects, Inc., a Washington, D.C.-based consultancy. "But IBM is pushing this strategy hard, and users should see the fruits of that by 1994."

Dzubeck said the year 1994 is important because most of the promises IBM has made about bringing the Open Software Foundation, Inc.'s Distributed Computing Environment, the Portable Operating System Interface and Advanced Peer-to-Peer Networking will be available on the mainframe by then. This will make the idea of the mainframe as a server even more technically feasible. ⚡

GLOBAL SERVICES

DOMESTIC AND INTERNATIONAL VOICE/DATA SERVICES, ACCESS EQUIPMENT AND REGULATORY ISSUES

Worth Noting

MCI Communications Corp. last week said it will offer shared satellite data services through its Andover, Maine, earth station to sites in Mexico, the Caribbean and South and Central America.

Regulatory Update

In preparation for 800 portability next year, **MCI Communications Corp.** last week announced a new service, dubbed MCI 800 MultiManager, to help users explore ways to divide 800 traffic among carriers.

In January, MCI will set up a customer support center staffed by MCI technicians and customer service personnel to work with users to coordinate and manage 800 service orders.

Once 800 portability is available, users will be able to route traffic to different carriers, depending on the time of day, geographic area or day of the week. These routing features, known as vertical features, cannot be purchased directly by end users under Federal Communications Commission rules, but instead must be purchased by carriers on behalf of users.

"MCI 800 MultiManager will allow businesses to take advantage of the benefits that 800 portability will offer — choice, flexibility and diversity," said Jonathan Crane, national accounts group manager for MCI. "Using this service, businesses that depend on 800 service for sales [and] customer service can choose how they want to split their 800 traffic in order to ensure greater 800 service reliability."

(continued on page 51)

RBHCs step up ISDN installation
Percentage of wire center lines supporting ISDN

Carrier	1991	1992	1993	1994
Ameritech	21	24	51	70
Bell Atlantic Corp.	49	49	58	87
BellSouth Corp.	13	25	41	52
Nynex Corp.	2	16	24	31
Pacific Telesis Group	30	44	57	69
Southwestern Bell Corp.	13	16	19	213
US West, Inc.	29	36	54	59

SOURCE: CORPORATION FOR OPEN SYSTEMS INTERNATIONAL, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

Fannie Mae shows off its nationwide ISDN network

Hopes to persuade other companies to follow suit.

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — Fannie Mae had a vested interest in participating as a user demonstration site in last week's Transcontinental ISDN Project '92 (TRIP '92).

Network professionals at the Federal National Mortgage Association — Fannie Mae for short — entertained a steady stream of potential customers and employees who came here to learn more about Integrated Services Digital Network and to get hands-on experience with ISDN applications, such as desktop conferencing, videoconferencing, file transfer and modem pooling.

Officials at Fannie Mae, which is in the midst of building a nationwide ISDN network, said they hope the event will prove there are plenty of business reasons for using the technology. For Fannie Mae, which may establish ISDN Basic Rate Interface (BRI) links to several thousand users, and for other current customers, wider user acceptance of ISDN can only be a benefit.

"We're glad to open our doors to show other users what the technology can do," said Newey Trelegan, director of telecommunications services for Fannie Mae. "We have selfish and altruistic reasons to open up. We realize that the more people who use ISDN, the lower the prices drop and the wider it'll be deployed."

Fannie Mae will use Primary Rate Interface (PRI) links provided by the regional Bell holding companies to link five regional offices and its headquarters here into AT&T's network, which will provide wide-area PRI connectivity. PRI will take the place of fractional T-1.

"We've been very patient with RBHCs and ISDN over the years, with the hope that we could eventually use it nationwide," said Trelegan. "We think PRI will be worth the wait."

> **"W**e're glad to open our doors to show other users what the technology can do."
>
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Fannie Mae, the country's largest provider of home mortgage funds, will use PRI to deliver automatic number identification (ANI) to call centers in the regional offices that handle inquiries from customers — primarily banks — across the country. Trelegan said ANI would enable Fannie Mae to enhance customer service.

"To build a high level of customer rapport, agents need to be able to greet the caller by name and ask about things like the caller's family," said John Logan, telecommunications manager at Fannie Mae. "It's fairly basic information but will help build a stronger bond."

(continued on page 62)

ISDN event attempts to drum up support

Users of the technology tout successes, yet links for the ceremony pointed to remaining glitches.

By Anita Taff
Washington Bureau Chief

RESTON, Va. — At a ceremony kicking off the Transcontinental ISDN Project '92 (TRIP '92) here last week, supporters proclaimed they have put behind them the problems that have bedeviled the technology for years.

The Corporation for Open Systems International and the North American ISDN Users' Forum cosponsored the event, during which 150 user and vendor locations opened their doors to show Integrated Services Digital Networks supporting a range of applications, including medical, educational, government and business applications.

The event showcased products and services based on National ISDN 1, a new nationally agreed-on version of the standard that is expected to alleviate many of the interoperability problems that have plagued ISDN.

Some 22 switches were upgraded to comply with National ISDN 1, an effort that will leave in place a coast-to-coast — although not nationwide — fabric of compatible ISDN equipment. The number of switches on the national net is expected to jump to approximately 100 by the end of the year.

Speakers at the event, which was dubbed The Golden Splice in reference to the Golden Spike that completed the cross-country railroad system in 1869, said the new ISDN network will be as important to commerce as the railroad was in the last century.

Barbara Franklin, U.S. secretary of commerce, described the national ISDN network as "a great step for U.S. competition and communications. There has been great frustration because the [industry] fragments didn't know how to work with each other," she said.

But the choice of the Golden Spike as a symbol was unfortunately prophetic. At the ceremony, during which the Golden Spike was to be hammered into

(conttnued on page 20)

Sprint offers ISDN access to local, global X.25 nets

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — Sprint Corp. last week announced that it has enhanced its network switches to enable customers to use existing ISDN Basic Rate Interface (BRI) connections to access hosts on the carrier's global X.25 network or to reach packet services offered by local telephone companies.

With the enhancement, called Local Packet Network-to-ISDN Interconnect (LPN-ISDN), firms with Integrated Services Digital Network BRI lines can support traditional X.25 applications — such as credit card verification and access to information services — faster and for less money.

Sprint said it has already made changes to routing tables residing in each of the switches in its SprintNet to support LPN-ISDN, adding that it is the first of the Big Three to do that.

"This is certainly a milestone in the evolution of ISDN, as it really solidifies the integration of circuit and packet technologies," said Daniel Briere, president of TeleChoice, Inc., a Montclair, N.J., consultancy. "It will enable companies with BRI to use SprintNet to reach far-end sites to form end-to-end domestic and international data links."

SprintNet is connected to public data networks in more than 100 foreign countries around the world, said Bill Pfeiffer, senior vice-president of Sprint Data Group, which operates the carrier's global network.

BRIs provide more capacity for bandwidth-hungry applications.

(continued on page 20)

NETWORK WORLD • NOVEMBER 23, 1992 **17**

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ISDN event attempts to drum up support

the tracks, the first two people who attempted it missed the spike, said Robert Metcalf, one of the principal inventors of Ethernet and the master of ceremonies here.

At last week's Golden Splice ceremony, there were significant technical difficulties. The ceremony featured a 384K bit/sec ISDN videoconferencing circuit linking sites in Chicago, Los Angeles and Hunts-ville, Ala., with Reston. Although the links with Chicago and Huntsville were adequate, the audio from TRIP '92 cochairman James Jacobson speaking from Los Angeles was garbled.

Conference organizers said the problems were caused by a lack of preparation time — they were only able to get into the hotel ballroom 36 hours before the event occurred — and the use of both a lapel and hand-held microphone by speakers in Los Angeles.

Organizers downplayed the glitches, pointing instead to the strong coordination between carriers, equipment manufacturers and users needed to get National ISDN 1 off the ground.

"Despite the audio problems we're having today trying to link up four hotel ballrooms, the [National ISDN 1] network is up, it's good and it is offering commercial service to ISDN customers," said Richard Aloia, cochairman of TRIP '92 and assistant vice-president of ISDN and Data Communications Technology at Bell Communications Research.

Irwin Dorros, executive vice-president of technical services at Bellcore, agreed that ISDN is finally headed in the right direction. "Fragmentation of the marketplace — multiple specifications, trialed in multiple regions and multiple networks — inhibited widespread deployment," he said. "The important difference now is that the full industry is working together for the single purpose of making ISDN a widely available and permanent part of the world's information networking infrastructure."

Many users at the conference viewing ISDN application demonstrations said they have used or are interested in ISDN.

Tim Dell, communications officer for the U.S. Army Missile Command at the Restone Arsenal in Huntsville, Ala., said the arsenal has used ISDN since 1989. It uses more than 900 Basic Rate Interface lines for desktop videoconferencing, electronic mail and access to host computers worldwide.

Commercial users are also beginning to

> Commercial users are beginning to consider ISDN, according to conference speakers.
>
> ▲▲▲

consider ISDN, according to speakers at the conference. Dr. Robert Gold, chief radiologist at the Memphis Medical Center, said he participated in an ISDN trial last year in which X-rays were sent over ISDN lines.

Although he is not currently using the teleradiology application at his hospital, Gold said he is interested and predicts widespread acceptance of such a technology.

"Until now, teleradiology has been limited by a lack of digital switches," Gold said. ISDN will be particularly helpful for doctors in rural areas or teaching hospitals that want to consult with specialists in urban areas, he said. ▄

Sprint offers ISDN access to X.25 nets

BRI lines with their two 64K bit/sec B bearer channels and one 16K bit/sec D signaling channel, offer more bandwidth than ordinary access lines, meaning customers will be able to better support high-speed applications, such as local-area network bridging, imaging and videoconferencing.

In a show of support for the capability, two regional Bell holding companies — BellSouth Corp. and US West, Inc. — are demonstrating LPN-ISDN as part of the Transcontinental ISDN Project (TRIP '92) in Reston, Va., late week, as is Hayes Microcomputer Products, Inc.

The event is designed to demonstrate that ISDN offerings from multiple suppliers can interoperate using National ISDN 1, an emerging ISDN standard ("ISDN steals spotlight as TRIP '92 gets under way," *NW*, Nov. 16). ▄
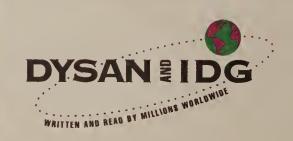
ENTERPRISE APPLICATIONS

CLIENT/SERVER AND ENABLING SOFTWARE: DISTRIBUTED DATABASE, MESSAGING, GROUPWARE AND IMAGING

Store & Forward

Systems Compatibility Corp. recently announced Version 2.0 of its file viewing and data import utility called Outside In for Windows. The upgrade supports graphic and compressed files, boosting to 120 the number of file types it recognizes. It also integrates with any Windows-based electronic mail system, allowing users to paste graphics, text, spreadsheet or database files into messages.

The software, which is priced at $89, lets users copy, move, rename and delete files, and provides basic file management.

Start-up **Applied Innovation Management** in Fremont, Calif., will soon announce Info-Power, a Unix-based systems management product that provides problem tracking, configuration management and inventory management capabilities.

The software consists of a proprietary database that resides on Unix servers from Sun Microsystems, Inc., Hewlett-Packard Co. and Digital Equipment Corp. It uses software daemons that communicate with client machines on Transmission Control Protocol/Internet Protocol nets.

The software costs between $7,500 and $10,000 for a 25-user installation. **Z**

Verity extends retrieval features to variety of apps

Software offers text, image retrieval capabilities.

By Timothy O'Brien
West Coast Bureau Chief

MOUNTAIN VIEW, Calif. — Verity, Inc. announced last week a suite of software interfaces that enables its Topic document retrieval software to work with a variety of custom and commercial applications.

Through Dynamic Data Access (DDA) interfaces to programs, such as Lotus Development Corp.'s Notes and leading SQL databases, the Topic document retrieval capabilities can be extended to provide access to data across a wide range of applications on a network.

The first implementations of DDA will include Topic SQL-Gateways, the Topic Gateway to Lotus Notes, and interfaces to word processing files and foreign language interpreters.

"Verity's strategy continues to be one of providing a way to access documents throughout an organization," said Darlene Mann, director of product marketing at Verity. "In its initial release, DDA will enable application developers to seamlessly provide access from Topic to data stored in departmental databases and Lotus Notes."

Verity's Topic document retrieval software offers both text and image retrieval capabilities. It also features concept retrieval, which lets users search for ideas or concepts in documents across the enterprise.

The Topic family of products currently supports 27 hardware platforms, six graphical user interfaces, 23 native document formats, all leading networks and five operating systems — DOS, Unix, IBM's OS/2, Digital Equipment Corp.'s VMS and Apple Computer, Inc.'s Macintosh OS.

With DDA, Verity will also provide documented software interfaces to third parties so that developers can create software interfaces that enable other software products to communicate with Topic.

Verity will include the soft-

Lotus intros cc:Mail that's object-based

By Wayne Eckerson
Senior Editor

LAS VEGAS — Lotus Development Corp. last week at Comdex/Fall unveiled an object-oriented version of cc:Mail for OS/2 2.0 that provides greater flexibility in accessing and manipulating cc:Mail messages and mail functions.

The new version of cc:Mail runs under Workplace Shell, an object-based graphical user interface that IBM incorporated into Version 2.0 of OS/2.

Workplace Shell allows cc:Mail functions — such as in-box, message folders, bulletin boards and directories — to appear as individual objects, represented as icons, on the OS/2 desktop.

Using OS/2 2.0's drag-and-drop capabilities, users can place objects anywhere on the desktop,

jump between objects and attach documents to objects. "The object-oriented metaphor of the Workplace Shell has allowed us to mail-enable the desktop environment," said Karl Wong, product manager for cc:Mail, Inc.
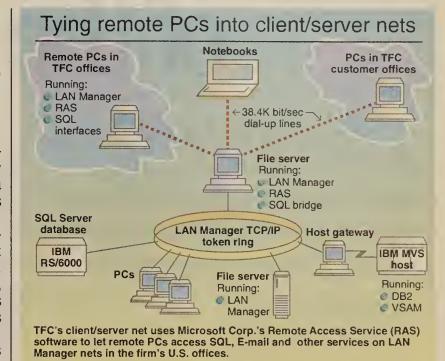
According to an IBM spokesperson, there are currently 450 applications running on the OS/2 2.0 Workplace Shell and 1,000 independent software vendors have committed to build Workplace Shell applications.

Analysts said the Workplace Shell could revive OS/2 fortunes if IBM can convince more independent software vendors to write applications for OS/2 instead of Microsoft Corp.'s Windows.

"Workplace Shell is one of IBM's secret weapons, but they are doing a lousy job marketing it and not enough [independent software vendors] are writing to it," said Mike Anderson, program director of Office Information Systems at Gartner Group, Inc. in Stamford, Conn.

Each cc:Mail object, when clicked on with a mouse, shows a menu bar as well as a palette of

Tying remote PCs into client/server nets

TFC's client/server net uses Microsoft Corp.'s Remote Access Service (RAS) software to let remote PCs access SQL, E-mail and other services on LAN Manager nets in the firm's U.S. offices.

GRAPHIC BY SUSAN J. CHAMPENY   SOURCE: TEXTRON FINANCIAL CORP., PROVIDENCE, R.I.

TFC connects remote users to applications

Microsoft's Remote Access Service provides a software-only way of linking remote users to apps.

By Wayne Eckerson
Senior Editor

PROVIDENCE, R.I. — Hoping to get a jump on its competitors, Textron Financial Corp. (TFC) is implementing a series of client/server applications that can be accessed remotely by customers and employees using notebook or personal computers.

The new applications, combined with TFC's commitment to migrating processing from a central mainframe to distributed local-area networks, should make the firm more nimble than larger competitors in the inventory financing business, said Paul Hamel, TFC's vice-president of information systems.

"We're building quality systems that will enable us to leapfrog the competition," Hamel said.

TFC's client/server applications run on Microsoft Corp. LAN Manager LANs at TFC offices throughout the country. The applications typically allow users to issue SQL queries that transparently access data on local Unix databases or a central DB2 database on TFC's mainframe in Irvine, Calif.

One application, called MainLink, lets TFC's customers using Microsoft Windows-based PCs dial into a LAN at TFC's Floorplan Finance Division in Minneapolis. The division's customers, pri-

marily manufacturers that make big-ticket items such as golf carts and lawn mowers, dial in to check the credit status and history of retailers and distributors that buy their goods via TFC financing. If dealers have enough credit, manufacturers use MainLink to notify TFC that they want to ship goods to those dealers and to obtain payment authorization.

TFC is in the process of rolling out MainLink to more than 130 manufacturers that have relationships with about 6,000 retailers and distributors throughout the U.S., Hamel said. MainLink will enable manufacturers to better manage their dealer relationships and to minimize losses, he added.

Remote access architecture

The systems architecture supporting the MainLink application will also soon support remote TFC employees, including sales and marketing staff, as well as field representatives, at TFC offices here and in Atlanta and Minneapolis. In addition, smaller TFC offices will use the remote access architecture to access applications and data in other TFC offices, instead of using dedicated leased lines.

In the MainLink application, credit and shipping approval data is stored on a Sybase, Inc. SQL

Our e-mail system lets you [s]
of the most complex ne[...]

At Lotus, we have the solution for communicating across the vast network you see before you: *cc:Mail,* *the world's leading LAN-based electronic mail system.*

With cc:Mail, you'll have full connectivity and transparent cross-platform communication at every level of your organization. Our e-mail system was built from the ground up to support network environments of different platforms and LANS—without the need for gateways. So you don't have to worry about reaching the people you need to reach.

A Mail System That Has All The Obstacles Licked.

Want to send text? Files? Graphics? Or Faxes? To Bob? Carol? Ted? Or Alice? With cc:Mail you can. Whether they're on the road or at home, whether they're on Macintosh, DOS,
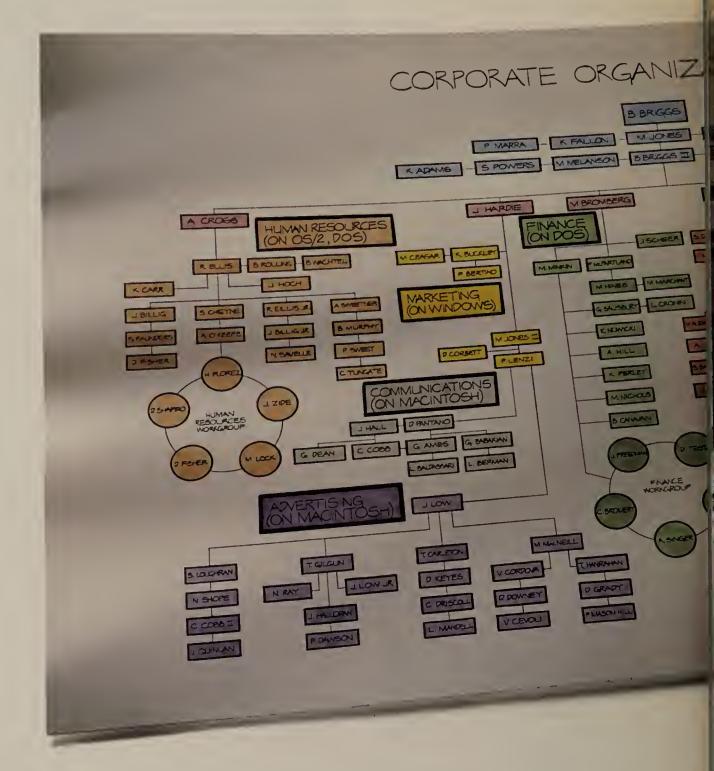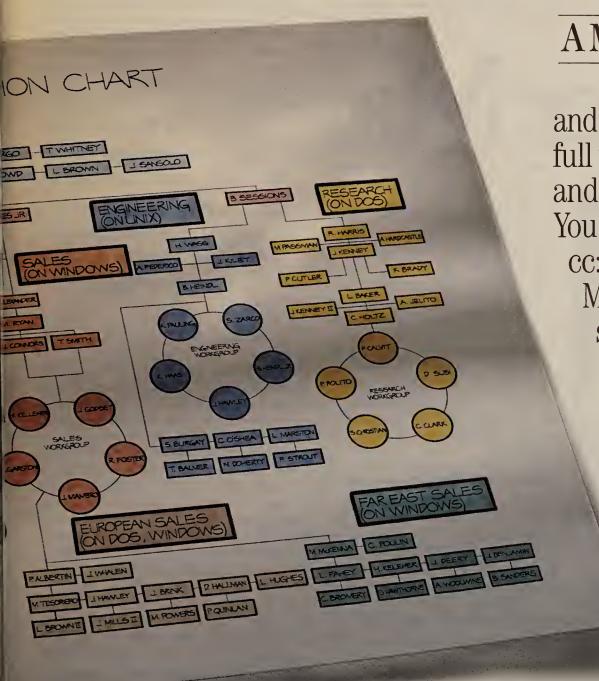
Windows, OS/2 or UNIX, whether they're on Banyan, Novell, LAN Manager or Appleshare, cc:Mail delivers. Even if you want to send mail messages to private

▲ *What platforms does cc:Mail run on? A better question might be what platforms doesn't it run on.*

end messages through one
tworks known to man.

ION CHART

▲ With cc:Mail, you can send a message to anyone in your organization, no matter what network, platform, or continent they're working on.

and public e-mail systems, you can do so via cc:Mail gateways for IBM® PROFS® MHS, X.400, MCI Mail® SMTP, SoftSwitch, DEC® and others.

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You'll find cc:Mail easy to install, maintain and administer, thanks to time-saving tools like full user move, directory synch and reporting, and automatic backup. You can also administer cc:Mail from any PC or Mac® on the network— something other e-mail systems don't let you do. cc:Mail is built on a fully scalable architecture. Which means it can accommodate 5 to 500,000 users. And grow along with your business.

N. RAY, SALES MANAGER, SRI LANKA

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For a free demo disk of cc:Mail on the platform of your choice, **call 1-800-448-2500.** You'll find getting through to people at the office isn't so hard after all.

Lotus cc:Mail

TFC connects remote users to applications
continued from page 21

Server relational database running on a Sun Microsystem, Inc. SPARCstation. The SPARCstation is attached to a Transmission Control Protocol/Internet Protocol LAN running LAN Manager. Historical credit data is stored on an IBM DB2 database in TFC's Irvine data center, which is currently linked to the Minneapolis LAN via switched 56K bit/sec lines.

TFC provides remote access to LAN resources using Microsoft's Remote Access Service (RAS) software, which allows remote PCs to function as full-fledged clients on a LAN Manager LAN, including issuing SQL database queries.

Remote PC clients running RAS software dial into a bank of modems attached to a LAN Manager file server also running RAS software. A Microsoft SQL Bridge on the server manages SQL calls between the remote PC and the Unix-based SQL Server on the LAN, giving remote users access to SQL data. Remote users can transparently access historical credit information stored in VSAM and DB2 files on the mainframe via Sybase's NetGateway, which resides on the Sybase SQL Server (see graphic, page 21).

"We went with Microsoft's RAS because it is a software-only solution," Hamel said. "Without it, we would have been forced to install a dedicated machine on the LAN for each remote client, which would have been too costly and cumbersome."

TFC sales and marketing staff will use notebook computers, for instance, to fill out loan applications when visiting prospects. Using RAS, they can then upload the application to a LAN Manager file system in the Atlanta office, access customer information on the mainframe and exchange electronic mail. This will speed the loan approval process, improve customer service and give TFC an edge over competitors, Hamel said.

The program is in the pilot phase, and by the end of next year, TFC plans to have 50 sales and marketing staff using notebook computers as remote access devices.

By the end of next year, TFC also plans to begin equipping its floor-plan checkers — field representatives who count inventory at dealerships — with hand-held computers. The floor-plan checkers will use the devices to count inventory and communicate with their home offices via RAS, possibly using wireless transmission.

The hand-held computers will enable

T FC provides remote access to LAN resources using Microsoft's Remote Access Service software.

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floor checkers to download inventory data from a remote LAN file server, upload the results of their physical count and print an invoice on the spot for lost equipment. This will eliminate paper and speed up floor-checking processing by days, giving TFC a competitive advantage, Hamel said.

TFC is in the process of replacing a low-speed, leased-line backbone network with a frame relay net from WilTel to connect its offices throughout the U.S. The new network will enable users at TFC offices to access resources at other TFC offices without going through the mainframe.

It will also let RAS users dial into the nearest frame relay node instead of a remote office, thus minimizing long-distance communications charges, Hamel said. ⊠

Verity extends retrieval features
continued from page 21

ware modules that have already been developed as part of Topic in its next version.

Instead of providing specific gateways for each SQL database, the DDA to Topic SQL-Gateways provides developers with a single SQL database interface that can be used to access any SQL-based database.

The Topic Gateway to Lotus Notes will allow transparent access to data in Notes databases, as well as other Notes repositories and files. Lotus has licensed the Topic document retrieval technology for inclusion in its upcoming version, Notes 3.0.

DDA interfaces to word processing files allows developers to use Topic to access non-standard word processing files, odd file formats or new file formats that are not yet supported in Topic. DDA also lets programmers use Topic to access data in a wide variety of foreign languages.

DDA and the adjoining software interfaces will be included in Topic 3.12, which will be available in December. ⊠

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS, ALLIANCES AND FINANCIALS

People & Positions

Effective Jan. 1, 1993, **Paolo Columbi,** Sprint International's director of systems marketing and sales in central and southern Europe, will head Sprint's new Paris-based unit, **Sprint International France,** which sells voice and data services there.

Paolo Columbi will market the Sprint Express calling services as well as local access to SprintNet, Sprint's global data network.

AT&T has appointed **Robert Gebo,** formerly sales director for AT&T in Albany, N.Y., vice-president of business network sales for the federal government.

Gebo will be responsible for overall sales of network services to the civilian and military branches of the U.S. government.

Linda Sarles, formerly vice-president of marketing for Xerox Corp.'s engineering systems division, has been appointed vice-president of marketing at **Sun Microsystems Computer Corp.**

Sarles will be responsible for all field marketing activities in the U.S., Canada and Australia. She will report to Bill Marr, vice-president of the North American and Australian field operations. ∎

Ameritech unit, MCI use SONET to maximize nets

Comdisco disaster recovery center to benefit.

By Ellen Messmer
Senior Correspondent

CHICAGO — Ameritech Services, Inc. and MCI Communications Corp. are each deploying Synchronous Optical Network (SONET) fiber rings here to take advantage of the technology's redundancy and management features.

One of the first beneficiaries of Ameritech Services' SONET ring will be Comdisco Disaster Recovery Services, Inc., whose Wood Dale, Ill., disaster recovery center will be a node on the ring that is scheduled to be completed by year end.

For MCI, which uses Chicago as its traffic crossroads between the East and West coasts, the dual-rotation feature of its newly installed SONET fiber-optic ring should provide instant backup in the event of a cable cut.

Ameritech Services recently awarded a three-year contract to Fujitsu Network Transmission Systems, Inc. for its Fujitsu Lightwave Multiplexer (FLM) 2400, which supports the SONET OC-48 speed of 2.2G bit/sec. The company also plans to use Fujitsu's FLM 600 for OC-12 620M bit/sec links, as well as its FLM Add/Drop Multiplexer for OC-3

155M bit/sec facilities.

By the end of this year, Ameritech Services will install its first SONET OC-48 fiber ring in the Chicago area. It will then gradually phase in SONET across the Illinois Bell Telephone Co. region as a replacement for older transmission equipment, according to Ali Shadman, assistant vice-president of technology management at Ameritech Services.

"SONET has built-in performance and monitoring capabilities that you don't have with existing asynchronous equipment," Shadman said. If the SONET equipment senses a transmission disruption, it switches traffic to the alternate path in the dual-rotating ring within 50 msec.

"You can issue commands to multiple locations to handle cross-connects electronically rather than manually," he continued. "Line provisioning can take less than a day, as opposed to several weeks."

Comdisco, which provides disaster recovery services to business customers, also wants to take advantage of SONET's flexibility and reliability, said John Sandberg, the company's director of networking products and

INDUSTRY BRIEFS

Digital Microwave suffers 2Q loss. Digital Microwave Corp. of San Jose, Calif., reported a net loss of $10.2 million for its second fiscal quarter, ended Sept. 30, compared with a net loss of $3 million for the corresponding quarter of last year. Sales for the quarter were $23.1 million, compared with $20.6 million last year.

Comverse revenues on the rise. Comverse Technology, Inc., maker of the Trilogue voice mail systems and Audiodisk digital recording systems, reported revenue of $9.9 million and net income of $1.6 million for the third quarter, an increase over last year's third quarter of 80% and 146%, respectively. For the first nine months of this year, the company reported revenue of $24.9 million and income of $3.4 million.

SunSelect widens distribution channels. Sun Microsystems, Inc.'s SunSelect product distribution unit announced its products will be available through six new distributors: Tech Data, Inc. of Clearwater, Fla.; GBC Technologies of Berlin, N.J.; Transparent Technologies of Los Angeles; Intelligent Electronics, Inc. of Englewood, Colo.; Arrow Electronics, Inc. of Melville, N.Y.; and Merisel Canada of Concord, Ont. ∎

Carriers air it out
Wireless activities of major long-haul carriers

AT&T
- Announces plans to buy 33% of McCaw Cellular Communications, Inc., the biggest cellular provider in the U.S.
- AT&T Network Systems supplies cellular network switches and other infrastructure equipment.
- Invests in EO, Inc., an early player in the market for personal communications services (PCS) devices.
- AT&T EasyLink Services forms alliance with RAM Mobile Data to enable wireless E-mail.
- NCR unit markets wireless LAN products.

MCI Communications Corp.
- Sells cellular holdings to McCaw in 1986.
- Files comments with FCC advocating three national PCS network. MCI says it hopes to manage one of them.

Sprint Corp.
- Operates cellular operations in rural areas with total population of 3.7 million.
- Announces plans to merge with Centel Corp., a Chicago-based carrier that has whole or partial ownership of cellular operations in 74 markets serving about 16.4 million potential subscribers. The merger will be voted on by shareholders Dec. 2.
- Offers Premier Microcel digital wireless key telephone system through North Supply equipment subsidiary.
- Joins Centel, Motorola, Inc. and a Colombian firm to bid for a cellular license in Colombia.

GRAPHIC BY SUSAN J. CHAMPENY

Long-haul carriers plot wireless paths

Current activities of the Big Three could offer users clues about future prices, service options.

By Bob Brown
Senior Editor

As differences in pricing, quality and service options erode among the long-haul carriers, support for wireless technology and mobile users could emerge as a major carrier differentiator.

Recent activities by the Big Three carriers have shed some light on their evolving wireless strategies and have signaled users to start paying more attention to these plans, which could result in lower prices and new service options.

AT&T, which recently announced plans to buy one-third of McCaw Cellular Communications, Inc. as part of a broad marketing and technology alliance, plans to tightly couple its land lines with McCaw's cellular net ("AT&T bid for McCaw to reshape landscape," *NW,* Nov. 9).

Sprint Corp., which will become a major player in the cellular market if its merger with Centel Corp. goes through, appears to be banking on a similar future.

But MCI Communications Corp. is pinning its wireless hopes on personal communications service (PCS) networks, which are expected by industry observers to become real in 1994. Earlier this month, MCI called on the Federal Communications Commission to set up three nationwide PCS nets, one of which MCI hopes to manage.

"What the carriers do in the way of integrating wireless technology into their overall network and service plans could be a viability issue for them over the long run," said Jeff Held, a partner in Ernst & Young's technology services practice in Vienna, Va.

That message is not being lost on the carriers, said Rob Rich, director of public network equipment and services for market research firm Dataquest, Inc. in Framingham, Mass. "The carriers' activities of late validate the importance of the wireless market," he said.

Out in front

Since it has been active in the wireless market for years across a broad range of market segments, AT&T is clearly the best positioned of the long-haul carriers to exploit the growing user interest in wireless services and products.

In addition to the McCaw agreement, AT&T is a major player in the cellular network equipment market, sells cellular phones and markets wireless local-area networks via its NCR unit, among other things, said Joie Pacifico, director of market-

Carriers use SONET to maximize nets

continued from page 25

services. To that end, Comdisco decided to create its own node on the Illinois Bell fiber ring. "We have access to the ring on our premises," Sandberg said. Comdisco's OC-12 node, which it will manage, will become an extended part of Illinois Bell's SONET OC-48 loop, he added.

Comdisco plans to pursue similar deals with New Jersey Bell Telephone Co. to support Comdisco disaster recovery centers in

Bergen and Carlstadt, N.J., early next year. There, Bell Atlantic Corp. will be using NEC Corp. SONET equipment.

In both cases, SONET links will replace the T-3 lines the company currently uses to access interexchange carriers.

MCI's new SONET ring is 660 miles long and interconnects the company's six Northern Telecom, Inc. S-DMS transport nodes in the Chicago metropolitan area. "MCI is the first long-distance carrier to implement a metropolitan-ring architecture using SONET technology," said Frank Kozel, MCI's senior vice-president of net-

work implementation.

Chuck Edfors, telecommunications manager at Montgomery Ward & Company, Inc., said he was pleased to learn about MCI's plans, particularly since Montgomery Ward is considering implementing Asynchronous Transfer Mode (ATM), an emerging high-bandwidth technology.

ATM's cell multiplexing and SONET's time-division multiplexing technology could coexist, asserted Ameritech Services' Shadman, adding, "There's no reason cell-structured signals could not be imbedded into SONET cells." **Z**

Long-haul carriers plot wireless paths

continued from page 25

ing and operations for AT&T's wireless communications services group.

Still, the most significant aspect of AT&T's wireless endeavors could be its efforts to give users access to a national service comprising land lines and cellular links, Pacifico said. The lack of a long-distance element in the existing cellular market has been a major shortcoming, she said.

While AT&T's strategy may initially be targeted at traditional cellular users, most of whom employ the service for voice communications, the company is taking a hard look at PCS networks, as well, an AT&T spokesman said.

AT&T is in the midst of a three-phase PCS trial at the 6-GHz frequency using its own network facilities and prototype handsets, he said.

McCaw, too, has conducted PCS trials, and AT&T will probably pursue further PCS activities through McCaw, a McCaw spokesman said. Many of the features for which PCS is hailed — low-power usage, digital technology and high capacity — are the kinds of capabilities that McCaw and other cellular providers are working to support on their existing nets.

"We're looking to support a lot of these features without having to start from scratch, like the PCS backers," he said. Cellular and PCS will coexist, the spokesman added.

MCI and Sprint

While AT&T may be the best positioned, its status could change quickly, given that the technology itself is rapidly changing, analysts said.

"AT&T's taken the lead, but MCI and Sprint can move quickly since they don't have as much infrastructure as AT&T," said analyst Held. "If they want to integrate new wireless technologies into their networks, they should be able to do it pretty quickly."

Ironically, both MCI and Sprint sold off cellular operations in the 1980s to McCaw and Centel, respectively.

Sprint may get that property back if its merger with Centel goes through, which will be determined when the two companies' shareholders vote on the deal Dec. 2. Until that time, Sprint officials are limited in what they can say about their wireless plans, according to a company spokesman.

MCI is focusing on the new wireless technology of PCS, said Steve Zecola, vice-president of PCS at MCI. The new digital wireless technology is expected to be useful as a high-capacity access link into MCI's long-haul net.

Even though MCI is pretty much on the sidelines now, the carrier is in a position to get involved quickly, according to Held. Among other things, MCI has existing equipment supplier relationships with Motorola, Inc. and Siemens AG that could be expanded to accommodate emerging wireless services, he said. Both Motorola and Siemens figure to be major players in the wireless market.

Regardless of who is winning at this early point in the race, users stand to benefit

(continued on page 49)

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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Manager Minutes

The **Washington Unix Users Group** and the **Federal Open Systems Conference** are sponsoring the fourth annual FedUNIX '92 Program and Exhibition Dec. 1-2 in Washington, D.C.

The show will include 120 vendor exhibits and a variety of free seminars, including sessions on Unix-to-DOS connectivity, the X Window System and a public forum examining Microsoft Corp.'s Windows NT.

For more information and a free pass to the event, call (301) 229-1062.

The **Association for Computing Machinery (ACM)** will observe the fifth annual Computer Security Day on Dec. 1. Besides observing the day by stressing the importance of computer security, ACM is offering a free brochure, called "300 Ways to Develop Your Computer Security and Contingency Planning," to commemorate the event. The booklet spells out ways to protect network data.

For more information or to receive the brochure, call ACM at (212) 869-7440. **Z**

Fed Ex showcases apps at Comdex/Fall

Extends its knowledge, expertise to attendees by displaying its 3 core business applications.

By Joanne Cummings
Senior Writer

LAS VEGAS — Federal Express Corp. has a long history of using networking for a competitive edge, and at last week's Comdex/Fall here, the company showcased some of what it has learned.

Dennis Jones, senior vice-president and chief information officer, said the company believed Comdex would be a good place to demonstrate to customers and information technology professionals how Federal Express has capitalized on information technology.

"We felt we could offer [attendees] the benefit of our experience," he said.

Although Federal Express was probably hoping to impress customers and win business, as much as to educate Comdex-goers, the three core business applications the firm displayed at its booth could have implications for other companies, too.

The first is an artificial intelligence-based fleet management-type system called "command

Users stop by the Federal Express booth at Comdex/Fall.

and control," albeit for a very large and sophisticated fleet. The firm uses the system to direct the air and truck traffic in and out of the company's Memphis, Tenn., hub.

"The hub is the center of our business, so the staff that oversees it is under a lot of pressure, very much like flight controllers or controllers on aircraft carri-

ers," Jones said.

He added that the internally developed AI-based command and control system enables these employees to handle the traffic logically and consistently.

An employee at a personal computer running a graphics-based front end to the system track every flight and truck passing in and out of the Memphis hub, Jones said. The AI portion, which runs on a local-area network server, is a rules-based logic database that employees can utilize to make traffic decisions.

"Just like flight controllers, our people have a very logical process they go through for either launching or redirecting trucks and aircraft," he said. "Quite often, this is a learned skill, so by putting this into an AI form, we're less at risk of having inconsistent decisions made. It ensures that the packages are directed swiftly and accurately to our customers."

Speeding customer service

The second application helps streamline customer service. Using X terminals from Network Computing Devices, Inc. (NCD) and Hewlett-Packard Co. servers, the firm's customer service agents running internally developed Motif-based software can seamlessly toggle between databases. This enables them to provide faster and better information to customers that call Federal Express to inquire about packages.

"We have 17 call centers with about 4,000 agents who take well over a quarter of a million phone calls per day," Jones said. "This application gives them better graphics and windowing capabilities, allowing them to be more responsive to customer inquiries. They can move from one system to another and have multiple databases on the screen at any point in time." Previously, the call agents used dumb terminals and were unable to toggle between applications.

The last application, called Powership, enables customers to act as their own customer service

BY ERIC SCHMALL

Dealing with users' rising expectations

As network managers, we constantly strive to increase services, reduce chargeback rates, improve response time, and expand overall network availability and reliability. But despite the nobility of all these goals, we should not lose sight of what they cause in terms of users' rising expectations.

Response time offers an excellent example of this phenomenon. If your first network was designed to provide an average response time of three seconds for on-line transactions, your users would come to regard that as a normal characteristic.

If, however, you introduce something to slow things down, you can expect a storm of protest. On the other hand, if you alter the network to improve response time, your user community will never allow you to return to the older, slower methods.

The same is true of newly introduced services. New technologies generally get rolled out as optional adjuncts that are generally available for additional chargeback fees.

For instance, when you add something such as voice mail to your suite of voice services, it is generally offered at an added cost. After it becomes entrenched and generally accepted, though, you'll find users demanding that voice mail become bundled with the regular phone utility. What was once regarded as an extra has evolved into an indistinguishable part of basic service.

The same effect occurs with communications systems performance. When you are trying out new technology, such as videoconferencing, no one expects perfect system availability and reliability. Even after the trial period, expectations are held modestly low while you learn

how to use the equipment and work out idiosyncrasies.

It isn't long, however, before the novelty wears off and users begin to rely on the new system as a routine utility. Then, you find you have to meet the traditional levels of availability and reliability found in other well-entrenched voice and data services.

Given these patterns, network managers must abide by several principles.

First, network improvements have to be universal. You must recognize that improving a system for only part of your user community will not last long. You should make everyone aware of the potential improvement and added cost, and invite them to join in if they desire.

If, for example, you only offer subsecond response time to a chosen few while leaving the rest of your network community at a three-second level, you will only provoke angry reactions from those you neglected.

Second, recognize that users will be generally tolerant of interruptions that occur while you are trying out a new technology — as long as it does not disrupt their regular service.

As your new system becomes more accepted and taken for granted, you will have to make a commitment to bring its reliability in line with your traditional systems.

Third, always consider — and make sure your user community understands — the economics that their expectations drive. For instance, you may start using a new system and contract for your initial maintenance using a low-cost option, such as overnight part replacement. That approach will result in system repairs taking as long as 24 hours.

After the first year, however, users will begin to rely on the

OPINIONS

USER FORUM
BY DOUGLAS WELCH

Make time to administer that ounce of prevention

Networks have grown from relatively simple departmental systems to huge interconnected monsters that stretch around the globe, helping many companies become more competitive. This may be good for a company's bottom line, but network managers are finding it more difficult than ever to keep these networks up and running.

Many net managers find that end users rely on the network so much that it is difficult to schedule preventive maintenance, such as figuring out how to load-balance network processing and upgrade hard disks and software. These administrators say end users find the need for such routine maintenance a bothersome interruption of their work.

Pleasing users and performing maintenance can appear to be mutually exclusive needs to network managers. Users want to have the network available around the clock, but without maintenance, reliable network access could be jeopardized.

It is up to network management to educate end users about the need for maintenance and enlist their support in scheduling any necessary downtime.

> End users rely on the network so much that it is difficult to schedule preventive maintenance.
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A first step is to let users know the benefits of a preventive maintenance plan. Network groups should communicate to users exactly what procedures are being performed on each server and the amount of downtime these procedures will require. Network managers should develop allies by negotiating downtime with departments that are fighting it. A little flexibility can go a long way in solving scheduling problems.

One way to limit the effect of maintenance is to only take down small network segments or individual servers at any given time. It is also possible to disable individual server-based systems, such as electronic mail, while still providing access to server-based files. Although the server might be slow while it is rebuilding a mail database, it will still offer basic functionality.

Network managers can also reduce the impact on end users by performing some maintenance using automated systems. These systems work during times of low server utilization, often overnight or on the weekend. Proper logging will assure network staffers that the systems completed their work correctly.

Network staffers are also an important part of this equation. Preventive maintenance is a tiresome and tedious part of network operations and is often performed in the middle of the night. While automated systems can reduce this work load, it is still the network staffers who have to do the hands-on work.

Staffers who are required to pull this duty should be given some reward. It doesn't have to be money. Adjusted schedules, compensation time or other perks go a long way in motivating network staff.

With a little cooperation between network managers and users, an effective preventive maintenance schedule can help keep the network running smoothly and provide the highest level of productivity. ⬛

Welch is a support analyst for a major entertainment corporation in Los Angeles.

EDITORIAL

Start shoring up your net for multimedia storm

Multimedia is bursting into the mainstream with tools that breathe video, image, audio and graphics life into applications.

A spectrum of companies — from giants such as IBM and Microsoft Corp. to virtual unknowns — is staking claim to this new market, and the show floors of conferences like Comdex/Fall glow and blare with multimedia demonstrations.

Multimedia holds the power to reshape your company — to usher in the era of the virtual corporation in which amorphous work groups, unhindered by the bounds of time, title or geography, pool their knowledge and skills through technology.

End users in your company may be testing the waters of multimedia and already running up against network constraints. More importantly, your company is probably working without a strategic network plan that ensures support for the multimedia applications of tomorrow.

You can prepare today for multimedia, or you can be caught off-guard when end users look to you for advice and support or, worse, when upper management asks why the competition has taken a lead over your company by using multimedia applications.

According to one top analyst, only about 25% to 30% of user companies have a strategic information technology plan. Those companies will not only be able to handle multimedia, but will roll out the applications that shake up their industries.

If you don't have a strategic network plan in place, don't wait. Take a hard look at all of your net components — from local-area networks and wide-area links to servers and internetworking gear. Will they stand the test of multimedia?

If you have a plan, take a hard look at it in light of the coming multimedia storm.

Remember, it's shortsighted to develop a plan based on the needs of a single application. You need to be working toward a utility network that can support dramatically increased demands, that can handle not only the applications you envision, but those you can't imagine.

Simply put, now's the time to take a leadership role in multimedia. ⬛

Consultants have much to offer if used wisely

Consultants can indeed bring a fresh approach to corporate network organizations. Used appropriately, these hired guns can help network managers realign operations, evaluate and implement new technologies, and upgrade staff skills and knowledge.

In times of dizzying technological and industrial change, network managers often have little choice but to bring in outside help to meet new and unforeseen requirements.

However, used excessively or inappropriately consultants can weaken the very network organizations they were brought in to support. In-house staff may be deprived of the opportunity to develop skills if management habitually brings in outside talent for technically demanding, high-visibility projects.

Worse yet, an overreliance on consultants can hurt staff morale and erode loyalty. Staffers may react with jealousy and suspicion to these outsiders. If all the plum assignments go to consultants, internal staff will feel unappreciated and seek their futures elsewhere.

Therefore, network managers must find ways to use outside expertise to strengthen the corporate knowledge base so that permanent staff members can continue to grow in their jobs.

In order to do this, network managers should avoid using outside experts for assignments that existing staffers are capable of handling. This requires managers to know their people and never underestimate the talents of their current personnel, many of whom may be itching for a challenge.

Also, managers shouldn't assume their technical staff knows nothing of the technology at hand — whether it be distributed databases, frame relay or any other hot technology — simply because they've never offered their opinions on these matters. Chat regularly with staffers. Reread their resumes. Invite them to volunteer for interesting projects. Managers who do this will be surprised by what they can accomplish if they just give current staff a chance.

If outsiders are used, then

> # A
> n overreliance on consultants can hurt staff morale and erode loyalty.
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bring them on-site. Typically, the consultant goes in to participate in several high-level discussions and then retires to his or her office to produce a report.

Kept at a distance, the consultant will be regarded by staff as a shadowy, alien presence.

To avoid creating such a Dr. Strangelove mystique around consultants, network managers should structure their assignment to maximize the time the consultant spends on-site interacting with staff. Provide on-site office space, require the expert to conduct periodic technical project briefings for staffers and invite the consultant to corporate social functions.

Also, designate staff members to work directly with the experts. Frequently, network managers bring in consultants to work on a project that eventually will become the responsibility of a full-time staff member.

Designating a staffer as an apprentice to the consultant will enable that person to discuss potential solutions with the consultant, perform research, monitor the consultant's progress and evaluate the consultant's reports. In this way, net managers can grow in-house expertise using the seeds of knowledge from outside the organization.

Managers who want their staff to continue growing can retain consultants as advisers. These advisers can become a semipermanent part of the team, a source of knowledge staff can go to on a regular basis.

Managers deciding to sign a consultant onto their team must wisely choose this consultant, limiting the roster to versatile individuals who are committed to training and advising internal staff over the long term while also fulfilling their project-specific responsibilities.

Of course, network managers face a distinct risk by putting outside consultants shoulder to shoulder with staff. The best internal people may be lured away by well-paying, exciting jobs with consulting firms. Smart network managers aren't deterred by this prospect.

In fact, smart network managers realize that hiring a consultant is often necessary to keep their operations on the leading edge of technological and industrial practice. Network managers who use consultants to strengthen their corporate knowledge base will gain far more in staff expertise and loyalty than they will lose in defections. ∎

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., a local- and wide-area network systems integrator.*

TELETOONS
BY FRANK AND TROISE

Network Manager's Handbook:
· Suggestion 14 ·

Video-based training seminars, if cleverly done, can be a good way to save on staff travel expenses and keep your people close to home

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LETTERS

Test participant talks

As a participant in the survey on tariff service providers conducted by TeleChoice, Inc. ("Tariff-tracking companies help keep tabs on services," *NW*, Oct. 12), I must speak out concerning the way the test and subsequent article were handled.

We were told that a conference call among the participants would be set up to discuss the guidelines and parameters. This never occurred.

We received a draft of the article by fax one morning and had only until noon to respond. In responding, we were under the impression that the purpose of our review was to check for factual errors, not to take one last shot at providing propaganda, as some companies appeared to do. Surprisingly, a large amount of this propaganda was included in the article.

If this article is indicative of the quality of reporting in *Network World,* I will put less credo in what I read in your publication in the future.

William Goddard
President
Telecommunications
Information Services, Inc.
Concordville, Pa.

TeleChoice's response: We stand by the test and feel it turned up the type of data we set out to uncover. We indeed never had a conference call. Instead, we spoke with each participant, including Mr. Goddard, individually and sent written trial parameters and guidelines to each participant.

The service providers were given a chance to correct factual errors about their firms before the article was published. Whether advertising propaganda was included in the article is Mr. Goddard's opinion. ∎

PHOTOGRAPHY ©1992 JON MURESAN

Ford

Pictured from left to right:

Jim Byers and Mark

Baker of Dana Corp., and

William Gergel and

Joseph Phelan of Ford.

Another bright idea

By JOANNE CUMMINGS

The Ford Motor Co. has a rich history of utilizing technology for a competitive edge, dating back to the company's founding.

In the early 1900s, Henry Ford introduced the assembly line and interchangeable parts, ideas that revolutionized the manufacturing industry and made cars inexpensive to produce and affordable to buy for the first time.

In that same spirit, Ford today is betting on a new supplier communications project that leverages such networking technologies as electronic data interchange, electronic mail and packet switching in an effort to compete better in an increasingly tight global marketplace.

The project's aim is to forge tighter links between Ford and its suppliers, trim the firm's operational expenses by streamlining administrative functions, increase worker productivity, reduce inventory levels at plants, and make the design of Ford's cars and its parts more efficient.

And Ford's efforts are paying off. The company recently disclosed better than expected financials. Its suppliers say Ford is helping them cut costs and ease operations by streamlining the way they deal with the carmaker's internal divisions.

This initiative has led *Network World* to name Ford a co-winner in this year's User Excellence Awards.

Ford has been a pioneering EDI user, having first utilized the technology in the early 1970s. With EDI, the carmaker has compressed to days the time it takes to order and receive goods. With some recent innovations, Ford has eliminated the need to track goods en route to its manufacturing and assembly plants as well as the time-consuming process of auditing supplier invoices.

Under the new project, Ford is taking communications with its suppliers to a higher level by enabling them to establish interactive links directly into Ford's network. It has also embarked on an innovative E-mail program with its key suppliers.

"Our idea was to bring our suppliers into the network to make them a part of the Ford team," explains Joseph Phelan, manager of supplier communications at Ford's Purchasing & Supply Division in Dearborn, Mich., and head of the new project. "Already, both Ford and our business partners are realizing significant gains. But without the involvement of our suppliers, we wouldn't have been able to do anything."

Interactive links

A major element of the new communications project was creation of a Direct Data Link (DDL) with suppliers. DDL is an interactive, real-time link that enables suppliers to tap into Ford's inventory systems, view real-time production information and keep better track of the carmaker's materials consumption. It also lets suppliers update Ford's system in real time.

Currently, DDL enables suppliers to establish dial-up links with Ford's IBM mainframe-based Material System 3 (MS3) system, which is used to track inventory. Inventory levels at the carmaker's 20 assembly plants are now accessible. Ford's 61 manufacturing locations are coming on-line with DDL, as are its 10 parts and supply sites, probably by the end of next year.

Suppliers pass asynchronous traffic to BT's Tymnet value-added network (VAN), which converts the asynchronous traffic to an IBM 3270 data stream needed to access MS3.

"Tymnet maintains control over the session and handles all the management responsibility," says William Gergel, supplier communications specialist for Ford's Corporate Supply Systems who is responsible for coordinating the technical details of the supplier communications initiative.

Suppliers are enthusiastic about DDL. "We've really come to rely on the system," says Ginny Cooper, material coordinator for Cold Heading Co., a Detroit supplier of fasteners to Ford. "We log in to the Ford system four times a day, and it gives us instantaneous updated information so we can check how closely our production systems are running with Ford's."

This is important when there are problems at Ford's assembly plants, for example, and materials need to be rushed to the plants in order to keep the assembly line up and running, according to Craig Tyrrell, section supervisor for Distribution Systems & Performance at Ford's Body and Assembly Operations.

"Say we're assembling green cars one day and we have an accident with a forklift that ends up smashing all the green bumpers," he says. "We need those parts that day or the assembly line will shut down. With DDL, the supplier knows about the situation instantaneously." That is because once the change in the assembly plant's inventory is keyed in to the MS3 system, it is immediately available to suppliers utilizing DDL, he explains.

Because the supplier can see that Ford's inventory level has changed, it can retool its production processes to make green bumpers to replace those that were smashed and get them to Ford quickly.

Without DDL, Ford would have to generate a replacement order and transmit it to the supplier, a process that takes more time than using DDL does.

"Even if we can give the supplier an extra hour, it gives them some breathing space," Tyrrell says. "The supplier process becomes more efficient, and the quality of the parts goes up because they aren't rushing them out the door."

DDL can also save on transportation costs because rather than having to rush parts out by air, for example, suppliers can better gauge Ford's needs, produce goods ahead of the date they are needed and ship them by less expensive means, such as rail or truck.

DDL augments Ford's current EDI process, giving the supplier the ability to garner real-time information. With DDL, not only does the supplier have the planning benefit of a traditional EDI message listing Ford's needs over a two-week horizon, as well as a regular daily EDI update to that two-week

Ford continues innovation by building tighter links with suppliers.

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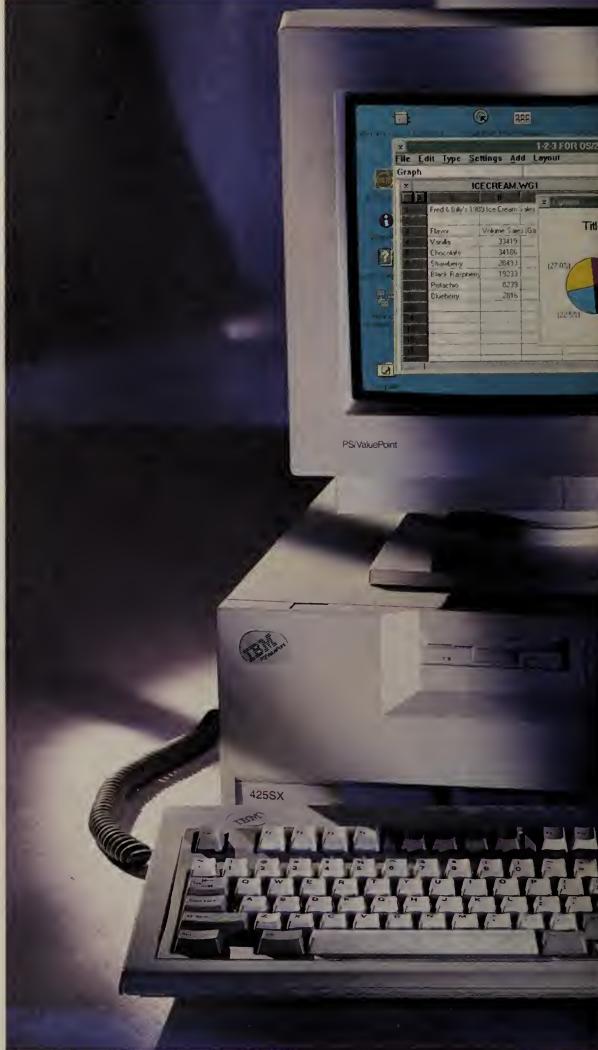
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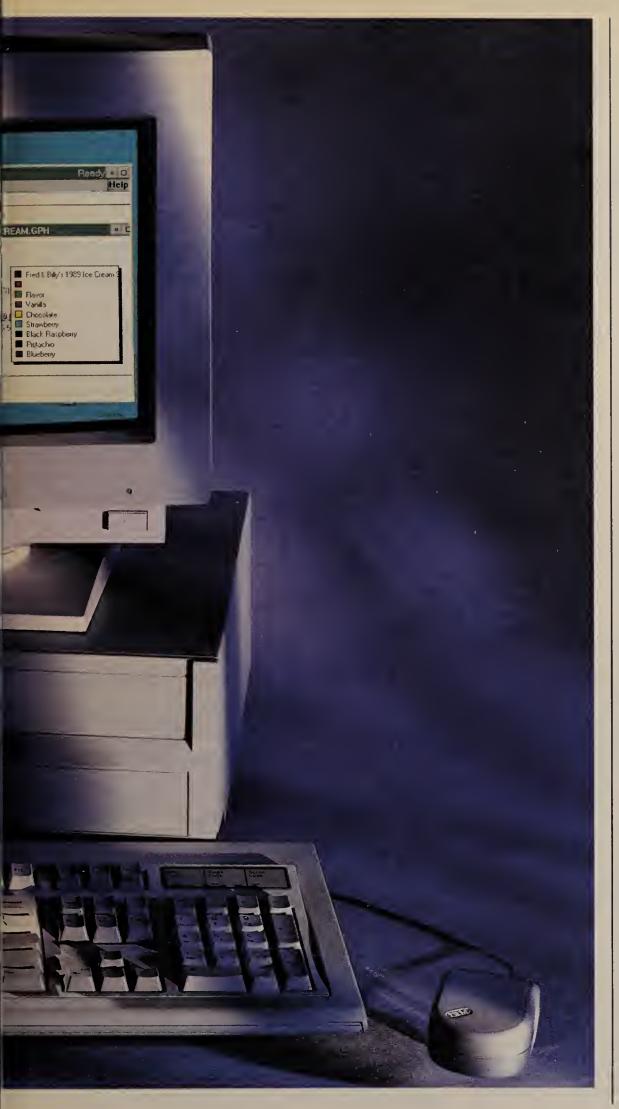
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Computers that do pr
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forecast, but it can also peek into Ford's database to view how its needs are changing in real time. This helps the supplier anticipate that an order will be coming so it can be ready to start production

application, he says.

According to Baker, that process goes beyond the time- and cost-efficiencies Dana gains from using DDL, and the link works out well for them because of Ford's training program. Ford staff went

since the mid-1980s, the network grew significantly when Ford recently ported PDGS from proprietary minicomputers to Unix-based machines. The net enables suppliers to download design plans from Ford sites in order to more easily incorporate changes to different parts (see "Ford's engineering file shuttle," this page).

By contrast, the EDI portion of the supplier communications initiative is marked by some fairly new innovations, including the

incorporation of a technique called evaluated receipts.

"We don't accept invoices from suppliers anymore," explains Frank Maraffino, staff accounting analyst at Ford. "We pay them according to an evaluated receipt, which has made the payment process 50% more efficient."

Maraffino explains that when supplies arrive at one of Ford's manufacturing or assembly plants, employees scan a bar code on the crate containing the

order, generating an electronic receipt. The receipt is sent via Ford's backbone network to the accounts payable department, which matches the order with the price negotiated previously between Ford and the supplier.

Ford then generates a check to pay for the order, which is usually mailed to the supplier, and at the same time, sends detailed remittance information to the supplier electronically. The carmaker says it now uses evaluated re-

EDI speeds delivery of supplies to Ford
Figure 1

1. Ford generates bill of lading telling railroad where to pick up and deliver supplies.

2. Ford sends bill of lading to railroad directly or via the IBM Information Network (IIN).

3. Railroads acknowledge receipt of bill of lading and use internal network to track shipment progress.

4. When supplies arrive at plant, Ford authorizes payment to railroad based on time of arrival and prenegotiated rates.

GRAPHIC BY SUSAN SLATER   SOURCE: FORD MOTOR CO., DEARBORN, MICH.

when it actually arrives.

Although 98% of the suppliers utilizing DDL communicate with Ford through dial-up links, large suppliers are installing dedicated links into Ford's IBM Systems Network Architecture net, further underscoring Ford's devotion to improving communications with its suppliers. Toledo, Ohio-based Dana Corp., an automotive components maker, is one of those large suppliers.

"Dana has about 30 sites that supply Ford, and because of the high volume of business we do with Ford and because Ford uses SNA, as we do, a direct dedicated link made sense," says Mark Baker, Dana's manager of network services.

Dana is installing an IBM SNA Network Interconnection (SNI) link to Ford that will enable it to seamlessly link terminals at its various sites to Ford's MS3. SNI is host-based software that makes separate SNA networks appear as a single logical net, thus making Ford's MS3 host appear as if it were part of Dana's net.

Dana figured that without the SNI link, interactive communications with Ford would have cost about $120,000 in onetime equipment costs, including an extra terminal on each desk, and $150,000 in annual service fees for utilizing a VAN. The SNI link costs just $2,000 a year for a 19.2K bit/sec leased line and about $12,000 for equipment.

"We already had terminals on our employees' desks," Baker says. "Rather than add another one, we installed the SNI link." The SNI link enables Dana employees to utilize the same terminal to toggle between their own network applications and Ford's

to each Dana site that is tied into MS3 and spent a week training Dana employees how to use the link to help them do their job more efficiently.

Baker says Dana maintains dedicated links to other companies to which it supplies parts, such as Navistar International Transportation Corp. and Mack Trucks, Inc. "But those are more for batch transfer of data, and they process it at a later time," he says. "Ford's DDL is a real-time link."

DDL's ability to let suppliers update Ford's database when it sends shipments to the carmaker is also a key selling point.

"If we make an error on an Advance Ship Notice, we can usually log on to Ford's system and correct it before Ford processes it," explains Jim Byers, EDI coordinator of computer services at Dana. ASNs alert Ford when a supplier has sent a shipment and inform the carmaker about the shipment's content. Thus, the interactive link lets Ford and the supplier track materials more accurately.

Three-pronged attack

In addition to DDL, Ford has improved its ability to trade computer-aided design and manufacturing files with suppliers over the hybrid Ford Packet Network (FPN), has pioneered the use of new EDI-based administrative processes and is fostering better communications with suppliers via an ambitious E-mail program.

The FPN uses a mix of public and private X.25 facilities to link Ford and supplier engineering sites that use Ford's own Product Design Graphics System (PDGS) CAD/CAM software. Operational

Ford's engineering file shuttle

An integral part of Ford Motor Co.'s supplier communications initiative involves linking Ford's internal engineering team with that of its suppliers.

This link, established over a mix of internal Ford Packet Network (FPN) and public X.25 services, enables Ford and supplier engineers using the carmaker's internally developed Product Design Graphics System (PDGS) computer-aided design and manufacturing software to work with the same data files, ensuring that the finished parts are as accurate to the design as possible.

Ford has been using the FPN, based on 56K bit/sec lines, to link its internal sites worldwide for about 12 years. In the mid-1980s, it opened the network to its suppliers.

Suppliers can link to FPN via domestic and international X.25 services and gateways (see Figure 2, this page).

The hybrid FPN supports about 100 data collector devices, which act as servers for work groups of CAD/CAM workstations. With proper security clearance, engineers can log on to any data collector and download or upload files.

According to Dennis Kirchoff, manager of the system software, operations and communications unit for Ford's CAD/CAM department, the key to working seamlessly with suppliers is that they use PDGS.

Kirchoff says they could use the Initial Graphics Exchange Specification standard for exchanging data between different CAD/CAM software, "but you end up losing the detail."

In addition, since PDGS was developed and is sold by Ford, it also results in added revenue for the carmaker.

Kirchoff says a direct engineering link to suppliers is key to making part design changes quickly and easily. Before the link was available, if a change had to be made quickly, a Ford engineer with a magnetic tape

drove to the supplier site and uploaded data to the supplier's system.

Using the packet network, suppliers can pull down Ford's engineering files, work on them and, when they're finished, return them to Ford.

Other car companies, such as Chrysler Corp. and General Motors Corp., rely on terminal-to-host setups that enable suppliers to work on host resident files, which makes the transaction slow and cumbersome, Kirchoff says.

But getting suppliers to purchase PDGS had been difficult because, until recently, it had to run on a Prime Computer, Inc. or Control Data Corp. minicomputer. This past year, however, Ford ported PDGS to Unix, enabling it to run on lower cost workstations.

"We've seen the largest growth [in the number of suppliers linked to FPN] in the last year because people can run it on lower end boxes," Kirchoff says.

"We have about 110 to 120 suppliers directly linked to us now."

According to Kirchoff, the level of detail exchanged between Ford and its suppliers is critical due to the nature of the engineering process. "We work from computer math models," he says. "The math model is, in effect, the design."

Using PDGS, engineers can make their changes directly to the math model rather than taking that model and building a sketch of a part. The math model can then be loaded into a part production machine such as a la-

Ford's CAD/CAM delivery vehicle
Figure 2

The hybrid X.25 net enables Ford engineers to exchange CAD/CAM files with parts suppliers at speeds ranging from 9.6K to 56K bit/sec.

GRAPHIC BY SUSAN SLATER   SOURCE: FORD MOTOR CO., DEARBORN

ser, which makes the part to exact specifications.

In the future, Ford is looking to speed up the supplier link using Switched Multimegabit Data Service or frame relay.

"The average file transfer is between 0.5M and 4.5M bytes," Kirchoff says. "With such data-intensive transfers, frame relay or SMDS would really make sense." ◪

— Joanne Cummings
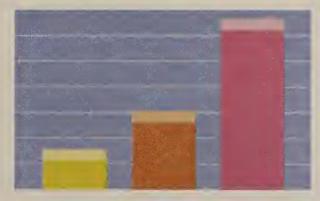
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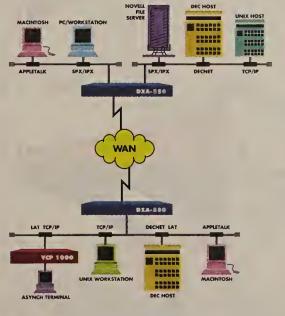
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ceipts with all of its suppliers, and about 100 to 150 of them now receive electronic remittances.

Eventually, Ford hopes to send electronic remittances to all of its suppliers, but Maraffino declined to provide a time frame for that.

"This puts the onus on the supplier to audit the payment, rather than having us audit the invoice," he says. "Now we don't need people in materials control tracking orders and auditing invoices."

Before adopting evaluated receipts, each time Ford received a shipment and invoice from a supplier, employees had to match up as many as 14 data items, seven from the invoice to the purchase order and seven from the packing slip to the invoice.

Now there is no invoice and they only need to match three data items, which provides a significant savings, according to Maraffino.

Ford's Phelan says the idea of going to evaluated receipts arose from a visit Ford made to a Mazda Motor Corp. plant in Japan. Ford owns 25% of Mazda, he says.

Seeing how Mazda streamlined its accounts payable process led Ford to examine its internal system. The idea of going to evaluated receipts grew out of that examination, he says.

While moving to evaluated receipts has cut Ford's work load considerably, the company has not laid off any employees.

"We haven't laid off any people," Phelan says. "We've lost some due to attrition, but for the most part, these efficiencies have freed up staff to concentrate on other issues. The idea was to let computers run the process so that people need to become involved only when there's a problem."

Ford has also used EDI to streamline the supply transportation process, which is important given that Ford purchases 50% of its materials — both parts and raw materials — from outside firms.

Ford currently has 12 major railroads participating in its EDI transportation initiative and plans to bring on four or five secondary rail carriers by year end.

Using ANSI X12 EDI transaction sets, Ford issues an electronic bill of lading when supplies must be moved from one site to another (see Figure 1, page 34). The bill of lading tells shippers where to pick up the supplies and where they are going.

The bill of lading goes from Ford's network to a railroad via a direct link or through the IBM Information Network (IIN).

When the railroad receives the bill of lading, it sends Ford an acknowledgment of receipt and Ford drops out of the process. The railroad tracks shipments and ensures that they arrive at their destination on time.

Before this system, Ford had about five people in each of its assembly plants de-

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$\mathbf{M}$oving to evaluated receipts has cut Ford's work load considerably.

▲▲▲

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voted solely to tracking shipments. Now those people are freed up for other duties, according to Charles Wheeler, transportation planning specialist at Ford.

When the shipment arrives, Ford uses evaluated receipts to eliminate the invoice. "The railroads have to audit the payment, rather than the other way around," Wheeler says.

EDI's other uses
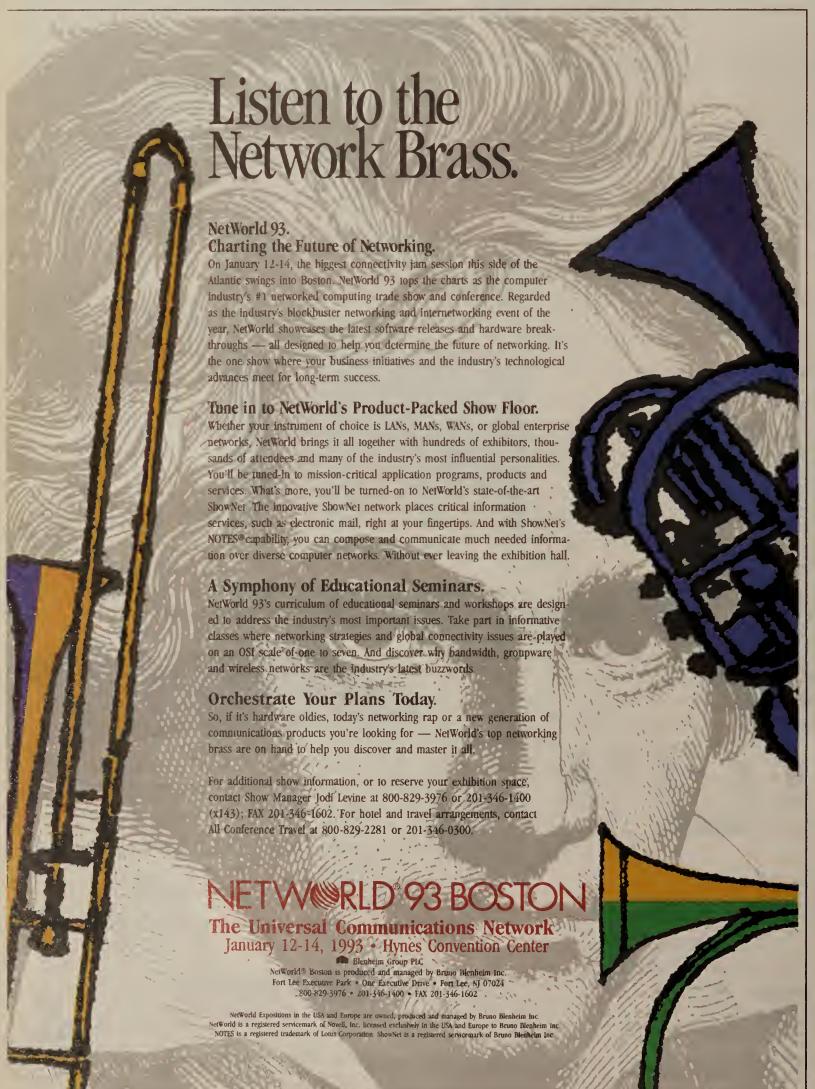
In addition, the 12 major railroads Ford works with are responsible for tracking shipments carried by subcontractors such as trucking firms.

Ford also utilizes EDI for purchasing non-production materials, but that system is not as refined. "We treat them with a less critical eye since they are a much smaller part of the business," Phelan says, referring to the non-production purchasing department, which procures items such as drill bits, furniture and office supplies.

"About 900 of our suppliers use EDI now, and that represents about 40% to 50% of our purchase orders," says Charles Robertson, industrial materials procurement manager for Ford's purchasing and supply staff.

Suppliers that are not linked to Ford through EDI handle purchase orders via mail or facsimile. Suppliers for non-production materials do not yet have a DDL capability.

Robertson says the EDI integration level is related to the criticality of the transactions. "If a certain chair isn't delivered at the right time, that's not as critical to our business as material for the car assembly

plant," he says. "A lot of these suppliers are used for only a small number of transactions, say three [purchase orders] a year, and you can't get the economies of scale to make true EDI worthwhile."

According to Robertson, Ford is evaluating ways that EDI can streamline the non-production purchasing process, such as enabling major suppliers to utilize DDL and updating its inventory as needed.

E-mail

Ford is also embarking on a new initiative to get suppliers to communicate with it via E-mail — specifically, IBM's Professional Office System (PROFS) — using the IIN as an intermediary. "Today, communications is mainly by phone, and with answering machines and phone mail, response time isn't that great," says Debby Janego, a supervisor in the Procurement Operations Department for Mail Production Purchasing at Ford. "If there's a problem, you want to be able to solve it that day — or hour even — and E-mail makes that possible."

In addition to the obvious savings in overnight mail and long-distance phone charges, linking suppliers to Ford via E-mail would enable it to save in other ways, she says.

As an example, Janego describes the current process Ford uses to receive cost-saving design ideas from suppliers. The carmaker issues paper-based forms that suppliers fill out with the details of cost-saving ideas, such as how to reduce the weight of a part. The supplier then mails the form to Ford, where data entry personnel enter the responses into a database that Ford engineers can tap into when evaluating which suggestions have merit.

But by using E-mail, Janego says, suppliers could key their ideas into preformatted forms that could be automatically entered into Ford's database. This would eliminate redundant data entry, cut data entry errors and ensure that good ideas can be evaluated by Ford immediately.

"An application like that could save Ford as much as $500 million or $600 million a year," Janego says, because it would increase the number of ideas submitted as well as the accuracy of the information.

Ford has been running a pilot test for the supplier E-mail program with about 15 firms for six months. The next step, Janego says, is to extend the program to the rest of the supplier base, although she says Ford would concentrate mainly on getting the largest suppliers to participate.

Suppliers interested in using E-mail to communicate with Ford dial into the IIN and access its host-based PROFS system. Using a menu-driven interface, they select tasks they wish to perform and send messages directly to Ford personnel.

Eventually, the carmaker plans to install an X.400 gateway, which would enable it to communicate with non-PROFS-based E-mail systems, Phelan says.

Looking to the future

The recent improvements to Ford's supplier communications program are just one part of a three-phase plan. The first phase, interactive supplier communications characterized by the DDL implementation, is complete, and the carmaker is focusing on the next two phases. Gergel says the details of these phases are still being hammered out but the intention is to fully link suppliers with Ford's internal networks.

The second phase will be to give suppliers a seamless way of transferring data files, such as spreadsheets and other business-related documents, with Ford. "We haven't decided the best way to handle this yet," Gergel says.

The third phase, which the company plans to complete by the end of 1994, will involve developing gateways between Ford's SNA backbone and its Transmission Control Protocol/Internet Protocol-based engineering backbone.

"We would not make it one huge backbone because that wouldn't be practical," he says. "But we'd like to interconnect them to make communications between the administrative side of Ford and the engineering side as seamless as possible."

Once the gateways are in place, suppliers can use the same interface to communicate with Ford employees on the TCP/IP backbone and the SNA backbone, he explains.

"Our goal is to have all of Ford's divisions present a common face to our suppliers," Gergel says. "If a supplier needs to communicate with one Ford division, in any manner, they should be able to do it the same way as with another Ford division. And better supplier communications, ultimately, results in better products for our customers."

Phelan agrees. "Basically, this is a win-win situation," he says. "Our livelihoods depend on customer satisfaction, and by [making] our suppliers more integrated members of the Ford team, we can respond faster to customer needs and, ultimately, provide higher quality products." ⚡

CEO's net vision becomes business reality

Five years ago, Allen Johnson, president and chief executive officer of the Medical Center of Delaware (MCD), had a vision about his company's future.

It wasn't the type of vision marked by hallucinatory revelations or celestial voices, but one in which he pictured network technology as central to the organization's success.

That vision of tying corporate network services to business goals has enabled the medical center to augment patient care, improve operating efficiencies and lower costs at the largest health care provider in the state. For those achievements, *Network World* has named MCD a cowinner of its Eighth Annual User Excellence Awards.

Plowing through data

Johnson was fed up with hospitals being what he calls "the lightning rod" for criticism leveled against the U.S. health care system. He hoped the network would deflect some of that lightning to the other links in the chain of health care — particularly health insurance providers and the unions that negotiate health insurance benefits for their members.

In addition, he hoped networking could position MCD as an information services provider to physicians' offices, clinics, regional businesses and even other hospitals throughout the community the medical center serves. Johnson's view is that in the future, doctors are going to need greater electronic access to information about patients' hospital stays.

"The way we're going to manage health care in the future is through very detailed data that is not only easily accessible, but also cogent to the decision-making process, in such a way that we don't need to spend months in the bureaucratic quagmire, plowing through data," he says.

Fortunately, the information systems (IS) department at MCD has Johnson's full and unqualified support in pursuit of this vision. "We look on [IS] as an investment, an asset for our organization both currently and in the future," Johnson says. "Too often, [IS] is looked on as an expense item — and when you're cutting expense, IS becomes one of the cuts. Our perspective is different."

As a result of Johnson's vision, Senior Vice-President Ward Keever spearheaded a drive away from isolated, terminal-based nets to distributed local-area networks. Along the way, he marshalled network management, applications development, and educational and help desk staff, which have turned MCD's IS department into a leading-edge service organization that has never lost sight of the business goals it strives to meet.

Only half-joking, Keever and Johnson both claim they plan to send their old systems to the Smithsonian as antiques.

In 1987, the medi-

cal center had about 225 Data General Corp. and IBM terminals distributed between its two main sites: Christiana Hospital and Wilmington Hospital. Those devices were connected by separate networks using several 9.6K bit/sec links and one 56K bit/sec link to the data center, which at the time was in Wilmington, Del.

At the data center, a medical records application ran on a DG S280 minicomputer and an internally developed patient management system ran on an IBM 4381 mainframe. Scattered throughout MCD's various departments were about 50 standalone personal computers running word processing and spreadsheet applications.

Nurses and doctors spent time filling out paper forms, which resulted in time away from patients. Most of the processes at the medical center, in fact, were still paper-based. In addition, bills often went out late to both patients and health insurance providers, and sometimes, the medical center mistakenly never charged patients for certain services rendered. Moreover, there were back orders on about 30% of the supplies nurses and doctors needed just to do their jobs well.

Laying it all out

Today, it's a totally different story.

In 1987, with future goals in mind, MCD began to install an enterprise network expected to exceed 3,000 net-

work nodes. Currently, the network consists of 66 Ungermann-Bass, Inc. Access/One hubs distributed in departments across the enterprise. Within each building, the hubs are connected via a fiber backbone, which is also bridged back to the corporate data center (CDC) in New Castle, Del., via T-1 lines.

Both the Christiana and Wilmington hospital sites are also connected via T-1 lines to ensure alternate path routing in the event of an outage (see Figure 1, page 40).
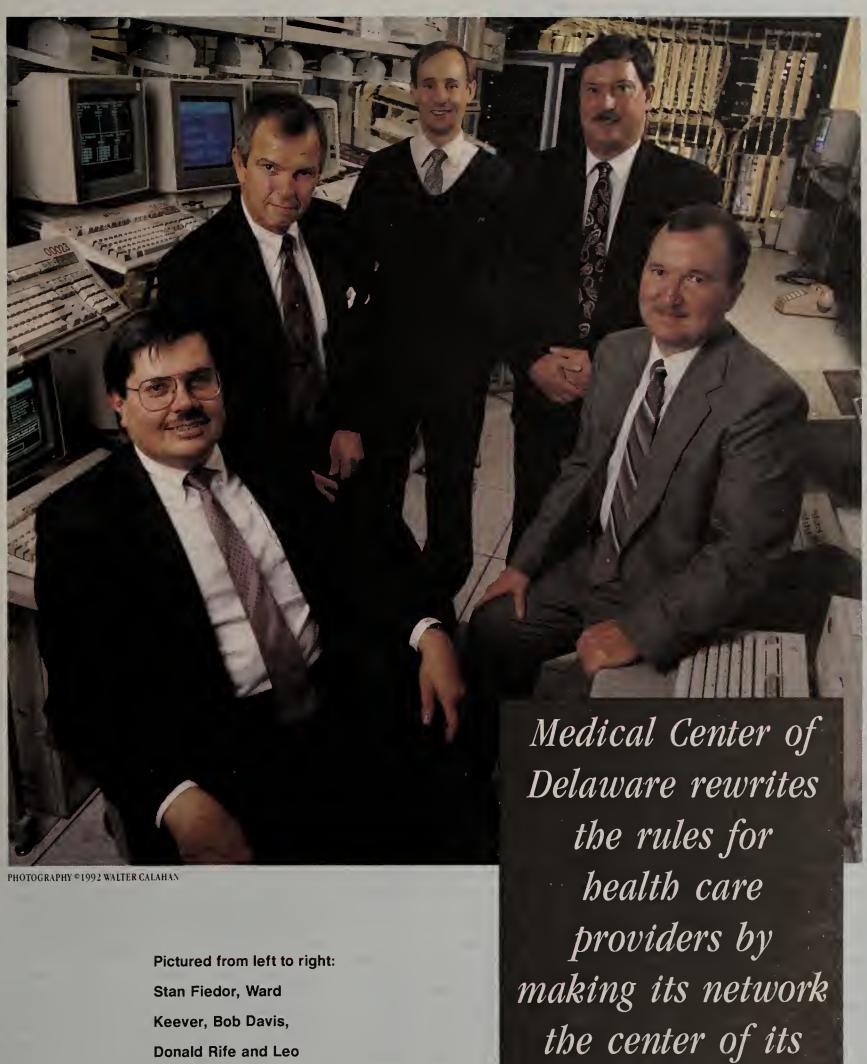
At the hubs, 25-pair wiring cables link Ethernet, asynchronous and coaxial IBM 3270 modules to punch-down blocks that terminate the unshielded twisted-pair wiring connections to downstream nodes. Workstations, servers and printers are connected to the Access/Ones in a star-wired topology (see Figure 2, page 40).

Corporate standards have played a central role in the wiring plan.

For example, one of the criteria the medical center used when choosing its wiring vendor was the ability to implement the consistent wiring scheme from the wall jack all the way to the wiring closet. This consistency enables the network staff to simply change cross connects when dealing with moves and changes. In a dynamic hospital environment such as MCD's, this ability was a big plus. By eliminating additional wiring costs that would have been required for moves and changes in which the end user wanted to

By ALISON CONLIFFE

PHOTOGRAPHY ©1992 WALTER CALAHAN

Pictured from left to right:
Stan Fiedor, Ward
Keever, Bob Davis,
Donald Rife and Leo
Gilmore.

*Medical Center of
Delaware rewrites
the rules for
health care
providers by
making its network
the center of its
business strategy.*

swap devices from a terminal to a workstation, the consistent wiring scheme also saved the medical center $25,000 this year.

In addition, because the UB Access/One is a concentrator, "You have a centralized point of reference," says Stanley Fiedor, data communications manager. "When a failure occurs, it usually affects just one point on that node. Via internal management facilities, you're quickly able to identify where a failure is and heal it — either remotely or go there physically and resolve the problem."

The alternative would have been for the network staff to take the entire LAN segment down to do binary division troubleshooting until they isolated the source of problems. Binary division troubleshooting involves continually dividing the LAN cable in half to check which half is not working, a time-consuming process that would have had a major impact on end users' ability to perform their jobs adequately.

Via the network, users can access applications running on an IBM 3090 and 4381, a Digital Equipment Corp. VAX 6610 and 6520, a variety of DEC Micro-VAXes, and a DG S280 and MV9600 — all located at the CDC.

Whole different perspective

Rather than make incremental changes to a system Johnson describes as a Model T, MCD's IS staff decided to look into the future to decide where it wanted to be in five years, then figure out what was needed to get there.

"Fortunately, we didn't have a lot of baggage when we started this process," Johnson says. "We didn't really have to do anything in terms of running dual systems and processes because we were just using Band-Aids, chewing gum and baling wire to keep [our old systems] together."

"A lot of people will sit there and say, 'Here I am; I'm stuck in this cement and I'd like to move forward,' " Keever says. "We sort of went out there and said, 'Here we are, but how do we get there.' " According to Keever, doing that gave them "a whole different perspective on what's important."

Part of that different perspective included the concept of a single systems image, which gives users throughout MCD a consistent interface to access applications, regardless of which computing platform they use. As a result, MCD has established a "universal workstation" — the IBM Personal System/2, of which it currently has about 1,100 deployed — and a "universal printer" — namely, the Hewlett-Packard Co. LaserJet. With these universal workstations, users can access both local-area network applications and applications running on mainframes and minicomputers back at the CDC.

Because this setup obviated the need for a separate terminal for each type of access, as well as the need to wire and connect those terminals to the network, MCD saved $120,000. Additionally, since the medical center uses inexpensive Rabbit Software Corp. token-ring gateways located at the CDC to connect the workstations with the mainframes, it saved $500,000. That's money it would otherwise have spent to buy IBM 3174 cluster controllers and other network equipment required to connect IBM 3270s to the network.

In addition, this setup gave them somewhat more intangible network management benefits because of the ability to centrally locate the gateways at the CDC.

Some end users can also access the network through 3270s, DEC VT terminals or DG Dasher 200 terminals. "One of the requirements for the network was to be able to integrate those existing devices into the network," Fiedor says. By doing so, MCD saved $200,000 it would otherwise have spent on special equipment and wiring to tie those terminals into the network.

The medical center recently migrated its Christiana facility to a collapsed Fiber Distributed Data Interface backbone. To save money and facilitate management, users with a collapsed backbone essentially use the backplane of a concentrator as their network backbone, with the speed of the backplane then dictating the speed of the network. MCD uses the 320M bit/sec backplane of one of its Access/Ones in this manner and has plans to migrate its entire network to collapsed FDDI later this year.

The collapsed FDDI is a temporary solution because, according to Fiedor, MCD expects to soon outgrow FDDI. MCD is contemplating moving servers running certain critical applications back to the CDC, which would require more bandwidth than FDDI affords.

In addition, MCD may decide in the future to run image traffic from radiology or perhaps multimedia traffic over the network. And, of course, MCD's plans to offer information services to large numbers of physicians, clinics and local businesses will also require greater bandwidth than FDDI. These types of moves would result in MCD moving to adopt an Asynchronous Transfer Mode backbone to support traffic loads to the data center.

For managing the hubs, the medical center's CDC relies on several UB network management facilities, such as UB's NetDirector, Network Resource Monitor and NetDetect. In addition, the network staff relies on Novell's LANalyzer and Legent Corp.'s NetSpy.

To manage traffic between the hospitals and the IBM mainframes at the CDC, the network staff uses an IBM VTAM facility called the System Display and Search Facility, as well as the Network Performance and Reporting System and a VTAM session manager, to look at sessions by terminal or by user.

MCD plans to eventually use IBM's NetView or Systems Center, Inc.'s NetMaster, as well as the DEC Management Control Center Director.

Using the currently installed net management, the network staff gathers statistics and issues a monthly report, which it uses for bandwidth management. By monitoring the amount of data traveling over the T-1 links and by tracking response times, the network staff can gauge traffic conditions and reallocate bandwidth as needed.

For example, if traffic surges between Christiana and the CDC, network staff can leave interactive traffic on the T-1 connecting those two facilities and reroute less critical print traffic through Wilmington. Fiedor evaluates network traffic and reallocates bandwidth monthly, with the goal of maintaining subsecond end-to-end user response times.

According to Donald Rife, director of computer services, bandwidth management is also used to evaluate longer term bandwidth needs. "We've determined a threshold that we want to try to stay under, but [using these reports] we can see things are growing and we can take corrective action. We plot out and say [for example] at this current growth rate, we'll run out of bandwidth in eight months, [so] we better do something."

Accessing the network

The single systems image — in which users across the company share the same interface — is an underlying strategy driving not only the decisions of the network staff, but also the applications development at MCD.

No matter where a user goes within the medical center, software and hardware are the same. "Those are subtle things that really matter. There's a consistency that definitely pays off big time. When someone goes to another department, they're immediately productive," says Bob Davis, information center manager.

In addition, according to Davis, when MCD personnel first began "messing around" with PC LANs, they realized they would have to provide end users with a simple means to access applications. Requiring users to learn the intricacies of logging on to a server or setting up a 3270 session would be asking too much.

So MCD's network staff built a menu system that insulates end users from underlying network complexities. Today, when a workstation boots up on the net, it sends a message to the server advertising what workstation type it is.

For example, certain workstations need access only to the IBM mainframe, while some require access to both LAN and mainframe applications, and still others need LAN, mainframe and VAX access. Currently, MCD has approximately 30 workstation types to support. Once a workstation checks in with the server during the boot process, the server checks a table to determine what privileges and capabilities that workstation should have.

"When the PC boots up, it asks the server, 'Am I running the software I should be?' If the server says 'Yes,' the PC says 'OK' and it just boots like normal. But if it says 'No,' then we've written a program that will actually let the server replace all the workstation software that's wrong and reboot the PC," Davis says.

This workstation support system enables the CDC to instantly change the software that any given workstation type can access, giving MCD a quick-and-easy way to perform application upgrades. "We essentially have 100% control over updating every PC at the boot level," Davis says.

For access to the mainframe applications running back at the CDC, the server downloads terminal emulation software at bootup to the appropriate workstations. For access to either the IBM mainframes or DEC VAXes, users need

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MCD's enterprise network
Figure 1

Wilmington Hospital — Workstations/terminals, Ungermann-Bass, Inc. Access/One hubs

Christiana Hospital — IBM PS/2 Model 80/90 server

T-1 circuits

Corporate data center New Castle, Delaware — Local bridge

Data General Corp. minicomputers

IBM mainframes

Digital Equipment Corp. processors

GRAPHIC BY SUSAN SLATER   SOURCE: MEDICAL CENTER OF DELAWARE, NEW CASTLE, DEL.

Lay of the LANs
Figure 2
Wiring plan for MCD's local sites

Wiring closet: Ungermann-Bass, Inc. Access/One hub, Ethernet card, Coaxial 3270 card, 25-pair cable, punch-down blocks, Unshielded twisted-pair, To fiber backbone

Device end: RJ-45, PC workstation, Coaxial 3270 terminal, Coaxial printer

All devices on departmental LANs at the MCD are connected via unshielded twisted pair to a UB Access/One in the wiring closet, which, in turn, is linked to other Access/Ones via a fiber backbone that runs throughout the building in a vertical ring.

GRAPHIC BY TERRI MITCHELL   SOURCE: MEDICAL CENTER OF DELAWARE, NEW CASTLE, DEL.

The rest of the best

These eight outstanding companies earned honorable mention in Network World's User Excellence Awards competition.

Avon

Charles Schwab

Complete Health

The Foxboro Co.

Intermountain Health

Northrop Corp.

Texas A&M University

University of Miami

Getting the picture

Videoconferencing is supposed to save organizations time and money by cutting down on travel. And when you have to travel throughout a state the size of Texas, there is a lot of time and money at stake.

Just ask Texas A&M University, which installed a videoconference network and figured that over 18 months, it has saved approximately $2 million in travel expenses, increased productivity and enabled the school to offer courses through videoconferencing.

For its efforts, the university has been awarded an honorable mention in *Network World's* eighth annual User Excellence Awards.

The Texas A&M network,

called the Trans-Texas Videoconference Network (TTVN), spans 14 sites across the state. Those locations are linked in a star topology via T-1 circuits to a videoconference hub at the university's main campus in College Station.

"Literally half the [T-1] circuit is being fed with compressed video and half with data," says John Dinkel, associate provost for computing and information systems at Texas A&M. This enables users to carry on a videoconference while exchanging and viewing data files.

"Some of the courses are being taught in a multimedia way," Dinkel says, adding that data can be transmitted, simultaneously with the video feed, between computers at the various sites.

Additionally, the data portion of the network is used to provide access to the university's automated library system as well as to such networks as the Internet from terminals that are not associated with the videoconference system.

TTVN is used to bring courses to remote campuses, essentially allowing faculty members to be in more than one place at a time. Administrators at the various Texas A&M campuses also use the network to conduct monthly meetings.

Last fall, two courses were taught using the network. By this spring, the number rose to 12, and this fall, 19 courses were taught using the network. That number is expected to reach 30 by this spring.

The number of administrative meetings held over the network in 1991 was 437. That number is

expected to reach 1,200 for this year and is estimated to total 2,000 in 1993.

At the heart of TTVN is a video switch from VideoTelecom Corp., according to Dinkel. The switch allows point-to-point and multipoint video connections.

Also, each of the 14 sites has a Timeplex, Inc. T-1 multiplexer. Video coder/decoders and data terminals used with the videoconference equipment are linked to the T-1 mux. A Cisco Systems, Inc. router supporting a network of data terminals located elsewhere on each campus also plugs into the mux.

By carrying data over the network, the university is able to extend services to state agencies. In many cases, the agencies gain 56K bit/sec service at the cost of a 9.6K bit/sec service, Dinkel says.

— *Eric Smalley*

Dialing for health care

With the cost of health care rising precipitously every year, health care providers have been casting around for ways to keep down costs without adversely affecting the quality of their services.

Intermountain Health Care (IHC), a Utah-based nonprofit health care provider, managed to save more than a million dollars a year while improving service to its patients in Utah, Wyoming and Idaho. Beginning in 1990, IHC has implemented wide- and local-area network technologies to network almost 50 medical facilities.

For its effective use of tele-

INTERMOUNTAIN HEALTH CARE

communications to help keep down soaring health care costs — and for successfully implementing very large LANs in a critical environment — IHC has been awarded honorable mention in *Network World's* User Excellence Awards.

IHC began designing an enterprisewide network in 1989, according to Blake Jensen, assistant vice-president of information systems/telecommunications at IHC.

"We were in the process of looking at how to make the health care environment within our service area more efficient," says Jensen. "With the cost of health care in the nation soaring, we were looking for ways to reduce costs and improve access."

The company needed to integrate its hospitals more tightly; they are clustered in regional areas and tended to duplicate coverage.

"The best possible way to facilitate the needs of the community is to not have those hospitals competing against each other," Jensen says.

The company's solution was to assign specialties to specific facilities and keep them from overlapping. That created a need for enhanced communications among facilities. "Information flow becomes that much more critical," Jensen adds.

IHC's solution was to implement a T-1 backbone net to link all its major facilities. The company's T-1 backbone connects several hub facilities via AT&T Acculink T-1 nodes. The company uses the hub sites to reach smaller facilities, which can access the backbone and other locations through their local hubs. The backbone supports LAN connectivity via bridges. The company has at least two host computers at each of the larger cities it serves. These include IBM Application System/400s and Tandem Computer, Inc., Data General Corp. and Prime Computer, Inc.

systems.

That setup saves the hospital system more than half a million dollars a year. "We're saving $600,000 in long-distance charges alone," Jensen says. "We had to make long-distance calls between facilities as well as calls to communities outside those facilities. Those are all local calls now."

Tying six platforms together without a consistent WAN was also costing the company about $600,000 a year, he adds.

In addition, the company needed to share information within each facility. A single LAN connects all of the equipment within a given site. The company has installed fiber-optic cable throughout its hospitals, although it is still using Ethernet hubs.

"We put the cable in with the idea of using FDDI in the future if we need to," Jensen explains.

The central servers on the network — one per facility — are Intel Corp. 80486-based personal computers. The front ends have no hard drives; they are attached instead to a large disk subsystem that can store 25G bytes of data.

By using servers attached to large disk subsystems, IHC has addressed one of the major bottlenecks in large LANs.

"Speed has been a problem with the file server end," Jensen says. "You would submit a request and the disk drive simply wasn't fast enough to respond. The approach we took was reducing disk access as much as possible." Access on the LAN, he says, "is as good, if not better, than access to the C drive."

And this approach has helped. "One of our hospitals has 600 attached PCs," Jensen says. "Peak load is about 250 users," which is fortunate since that's about all the network can handle. "We are starting to bump into barriers."

Users usually get network access on a first come, first serve basis, although the clinics are granted priority.

IHC, nevertheless, prefers the single, large LAN rather than interconnected smaller ones. "When you don't have to support a departmental LAN, you don't have to interface to their LANs," Jensen says. "In a lot of cases, that provided additional degradation of response."

A single LAN also lowered overhead costs for the company. "If you have multiple LANs in a hospital, you have multiple individuals doing support," he says. "Our experience was there were some highly paid professionals or clinicians spending an inordinate amount of time doing backup and support. We drew that support back."

— *Jerry Lazar*

Engineered net redesign

The Foxboro Co. took a serious look at its networking infrastructure in 1987 and didn't like what it saw.

With more than 200 sites worldwide, the company was dotted with islands of automation, and the main method for sharing data was sneakernet. In addition, the company's financial reporting systems were not as accurate as they should have been.

"Our president knew we had a problem because he couldn't get reports in a timely manner," says John Puckett, manager of engineering and network services at the manufacturer of process control systems. "And he didn't believe that they were accurate or that they reflected a good perspective of the business."

> ## "The net was designed to facilitate the engineers' dream of reusable engineering."
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So Foxboro hired Touche Ross & Co. to assess its information systems and recommend how Foxboro could improve them. "It was not particularly a good assessment," Puckett says.

Armed with that impartial assessment, Foxboro appointed a management team that was charged with straightening out

the situation. The team quickly built a Transmission Control Protocol/Internet Protocol network that laid the foundation for a successful migration from mainframes to Unix workstations.

For reducing MIS expenses from $27.7 million per year in 1987 to just $14.4 million in 1992 and increasing productivity, Foxboro has been given an honorable mention in this year's User Excellence Awards.

Rather than making a wholesale systems swap from mainframes to workstations, Foxboro decided to handle the cutover in small, manageable phases.

"This allowed us to test that our designs were correct, and it let us incorporate what we learned to better implement the next phase," Puckett says. "It also allowed us to get progressive financial returns on the investment. If we implemented this $14 million investment [all at once] and had to wait five years before it was returned, that wouldn't make good business sense. By investing, say, $1 million and getting the return within a few months, we were able to feed the process."

The TCP/IP net enables users with a variety of vendors' hardware at 11 sites to seamlessly share files utilizing the Network File System as well as communicate via electronic mail. In addition, another 100 sites are linked into the network via public X.25 and dial-up connections.

The company has installed about 60 servers, primarily Unix, each of which has been partitioned to provide a public file-sharing area. This enables engineers in the firm's Houston offices to view and access product designs developed by engineers

in Foxboro, for example.

"The net was designed to facilitate the engineers' dream of reusable engineering, which means that if something has already been done, such as a piece of code has been written, don't rewrite it, use it again," Puckett says.

Enabling engineers to access the information they need seamlessly from their own workstations has resulted in an eighty-

FOXBORO

A SIEBE COMPANY

fold improvement in engineering productivity.

In addition, the new net has enabled Foxboro to completely automate its order-entry system, a move that has cut the process from 43 manual steps in 1987 to just six electronic steps today.

"This has cut our order-entry cycle time from 25 or 35 days to just two days today," Puckett says. It has also resulted in more accurate orders for the customer, he says.

Eventually, Foxboro will migrate its TCP/IP network to the Open Systems Interconnection protocol, "probably within 10 years," Puckett says. For now, the company is constantly assessing the network and finding ways to do things better.

"Our motto is that you should always compare yourself against the best in the world, not just how you did last week or last year," Puckett says. "And you should always look up from time to time to make sure you're still heading in the right direction." ∎

— *Joanne Cummings*

Hurricane watch

Hurricane Andrew was a personal and financial disaster for many when it struck the coast of Florida earlier this year.

But for the University of Miami, the disaster was mitigated somewhat, especially in its network services unit. Earlier in the year, the school had begun implementing a disaster recovery plan to cover its Synchronous Optical Network (SONET), metropolitan/wide-area network, Systems Network Architecture network and various local-area networks.

The disaster recovery plan was 50% in place when Andrew hit in August, says Ruben Lopez, director of computer and network services at the university.

But that was enough. "The net never went down," says Ted Lipsky, project director for telecommunications at the school.

The foresightedness of the University of Miami and its board

of trustees in creating and implementing its five-year plan, as well as the ingenuity with which the plan is being implemented, has earned the school honorable mention in *Network World's* User Excellence Awards.

It wasn't a coincidence that the university's disaster preparedness plan was in place. Its implementation is part of the school's five-year Telecommunications Strategic Plan, which was adopted in June 1990. Almost all of the networking jobs done at the university since that time have been under the aegis of that plan.

Other activities have included implementation of SONET on its medical campus and an innovative, low-cost alternative to electronic tandem net software.

The five-year plan covers all aspects of telecommunications within the university environments, examines projected growth of the school and its net-

working needs, and outlines schemes for expanding that net. It plotted the evolution of the college's networking environment from what Lipsky called "early 1980s analog technology" to an all-digital network.

One of the school's foremost objectives was to provide reli-

UNIVERSITY OF Miami

able, self-healing networks with built-in redundancy.

When the plan was implemented, the university had six AT&T Definity switches in place. The school has three Definity Generic 2s and three Generic 1s that form a metropolitan- and campus-area network. Two Generic 2s are linked to a Generic 1 in a triangular fashion. The remain-

Altering its image

As business giant Ross Perot proved with Electronic Data Systems Corp., the insurance industry is a prime consumer of network technology due to the sheer amount of information being handled and the need to disseminate that information throughout the organization.

Complete Health, Inc. of Birmingham, Ala., is continuing that tradition. The company has implemented imaging technology across its corporate local-area network, which has virtually eliminated the internal use of paper. It has also provided users across the organization with access to data and improved the efficiency of its services.

Complete Health's successful accrual of benefits from using LAN-based technology, including imaging, won it honorable mention in *Network World's* User Excellence Awards.

Founded in 1986, Complete Health quickly began experiencing "good growth," according to William Featheringill, president and chief executive officer of the company. Today, the company covers more than 300,000 people in the Southeast.

But along with that growth came the insurance industry's bete noire: Complete Health began drowning in paper.

The health care provider's avowed policy is to invest in computer systems to improve service, and several years ago, the company began looking for a technological solution. It needed to integrate all of its departments, track claims, enter data and quickly redistribute that information.

After doing some research, Complete Health discovered that no off-the-shelf system could meet its needs. The company contacted a local firm, Macess Corp., to develop a total network solution that would include imaging capabilities, and it came up with a product called I-MAX.

"We basically gave Macess the functional requirements from a business operations point of view," Featheringill says. "We told them what we wanted to do, and they took it from there."

Today, the company operates a very large LAN: About 350 80386-based personal computer users operating under Microsoft

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> ## "The interesting things are those that go beyond imaging."
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Corp. Windows are tied together in a Novell, Inc. NetWare network. The main server is from NetFRAME Systems, Inc.

"We used to have a lot of problems with network stability until we put [the NetFRAME server] in," says Featheringill. The network is, in turn, connected via gateways to the company's IBM Application System/400 minicomputers, which house claims processing systems.

Information is scanned into the system on the LAN, where it is indexed and filed in electronic folders. Images of claims — over 400M bytes worth — are processed overnight. The extracted data is passed on to the host. Customer representatives have access to all the data in the folders, including claims, enrollment forms, logged telephone calls and correspondence.

"Our data entry rate has doubled" since the system was implemented in 1991, Featheringill says. Complete Health currently scans over 8,000 claims — more than 12,000 discrete images — every workday.

"We don't like to think of it as an imaging system," Featheringill says. "The interesting things are those that go far beyond imaging. We measure work flow, we handle customer service calls, archive computer reports — all of these are things that imaging allows us to do."

Storing the images electronically has improved the company's service in several respects, Featheringill says. For one thing, accountability has improved.

"A big problem used to be that things would get lost," Featheringill says. "Things would be forwarded from one department to another and just languish about. We used to make a lot of copies whenever we forwarded anything because claims would get lost [between offices]. And that's the stuff of lawsuits."

With imaging, redundant claims copies are eliminated and 50,000 pages of reports are stored on optical disk.

"A lot of reports are generated that people don't really read," Featheringill says. Even when the reports are briefly glanced over, most people don't want the entire report, only a few pages. "For those exceptions, they can always send the file to a printer. That one little thing saves us $12,000 to $13,000 a month."

Complete Health recognized that image access time is a problem on networks that support imaging systems. "What most people are using is WORM drives with a jukebox," Featheringill says. While that's fine for one or two users, it's awkward for an insurance company.

"When you get into a situation where you have 300 people trying to get into one jukebox with six heads and six seconds to change disks, you get a hell of a response-time problem."

The I-MAX solution is perhaps unique: Complete Health has 150 optical storage devices on-line at once. They're off-the-shelf CDROM players. "We press our own platters," Featheringill explains. The company puts one in dead storage and the other on-line.

"The system is designed to take the platters off-line after they get old, but the storage is so inexpensive, we just add another drive," he says. "Basically, all our data [since the system went up] is on-line and available."

— *Jerry Lazar*

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ing switches are linked via T-1 tie lines to the main Generic 2s in the triangle. Access to the public net is gained by going through one of the two main Generic 2s. The remote Generic 1 switch in the triangle acts as a tandem switching node between the Generic 2s.

Additionally, it provides service to more than 500 university residents.

Separately, the university installed a SONET net to address growing user bandwidth needs.

Upcoming stages of the plan call for the migration from broadband coaxial cable in its data networks to a fiber-optic backbone (a migration that has already begun) and the completion of its disaster recovery plan.

The university benefited from the aggressiveness of its telecommunications department. The five-year plan called for disaster recovery to be implemented by 1993, but the department had decided to get a head start.

When Andrew hit in the early morning of Aug. 24, the uninterruptible power supply systems, including batteries and generators, switched over "without missing a beat," according to Lipsky. Routers, gateways and token-ring LANs all stayed on-line, even during the heart of the disaster.

Of course, even the best laid plans can go awry: The loss of a microwave tower caused some service interruption to the school's Key Biscayne location. And a failure in the water cooling capabilities of one air conditioning system required that the system intermittently be turned on and off manually so it wouldn't burn out.

But, overall, the university came through with flying colors, lending credence to Lipsky's position that "good disaster recovery is not recovery, it's disaster planning."

— *Jerry Lazar*

Simply using networks

Not all network innovators are solving problems on the scale of creating an intricate global multivendor network. Many develop unique applications that run on small local-area networks or use simple, cost-effective technology in unexpected ways.

For instance, neurosurgeons at the Chicago Institute of Neurosurgery and Neuroresearch (CINN) use Artisoft, Inc.'s LANtastic peer-to-peer network operating system to pull off a miracle of modern medical science. LANtastic helps neurosurgeons simulate delicate radiosurgery that determines how to apply focused doses of radiation to patients' brains.

Developed by a company called DosePlan, Inc., which is run by Tomasz Helenowski, a neurosurgeon at CINN, the simulation runs on a Digital Equipment Corp. VAXstation and determines coordinates for applying lasers to a patient's skull and ordinarily outputs the coordinates to a plotter.

The simulator also uses several personal computers on a LANtastic LAN. One of those PCs has a serial link to the VAXstation and emulates a terminal in order to capture the plotter output, according to Helenowski. That PC forwards the data over the LANtastic network to two other PCs that drive a bank of eight monitors.

The PCs combine the plots with magnetic resonance image and CAT scan images of the patient to simulate the surgery.

While DosePlan may be at the cutting edge of technology, the legal profession is associated with clogged courtrooms and mountains of paper documents. But the U.S. District Court in Sacramento, Calif., has installed a LAN to improve file sharing and provide electronic mail.

About 80 to 90 judges and law clerks use the Novell, Inc. NetWare LAN each day, according to James Yaple, system manager for the court. These judges and law clerks prepare documents, dial out to on-line legal databases and verify case citations, he says.

The LAN has been especially helpful in speeding up the processing of petty offenses and prisoner petitions by enabling judges and law clerks to communicate via electronic mail instead of relying on paperwork shuttled between offices.

Indeed, government can be on the leading edge of technology. The city of Charlotte, N.C., has rightsized its data processing and communications facilities by installing wireless and fiber-optic metropolitan-area networks, according to Guy Hutchins Jr., communications systems manager for the city.

Charlotte is the first U.S. city to install a radio-area network, Hutchins says. Broadcasting at 900 MHz, the network transmits IBM Synchronous Data Link Control traffic from as many as 21 remote sites to the city's mainframe at 19.2K bit/sec. Charlotte uses RAN19 wireless front-end processors from Multipoint Networks, Inc., which saves the city between $4,000 and $5,000 a month in leased-line costs, Hutchins says.

Charlotte also has a fiber-optic metropolitan-area network that links 10 city and county government buildings. The net supports a range of data communications services, including Ethernet, T-1 and IBM 5250 traffic for the city's Application System/400 minicomputers.

Also in the public sector, Maryland Public Television (MPT) uses a NetWare 3.11 LAN to enable writers at workstations to share program scripts and to assist in managing the station's tape library.

Writers who prepare scripts can send data via the net to a teleprompter from which TV anchors read news and other information to viewers. The net can also be used to send directions to the robotic tape library management system MPT uses to handle the playback of recorded material, thus enabling the station to automate the order in which tapes get played.

In the private sector, manufacturing automation has long been an application for net technology. Logitech, Inc., a mouse, trackball and scanner maker, found that a PC LAN can be a viable platform for a materials resource planning (MRP) system.

Logitech installed an MRP system from Expandable Software of Santa Clara, Calif., on its 600-node NetWare 3.11 LAN. The principal advantage to using a PC LAN-based MRP application is that the company is able to scale the system to its needs without having to purchase a system that is too big to fit its immediate needs.

These examples show that companies can and often do get a strategic benefit from using networking technology.

— *Eric Smalley*

Schwab automates activity

When commissions on securities transactions were deregulated in 1975, San Francisco-based Charles Schwab & Company, Inc. was formed to take advantage of the unfettered market. For Schwab, like all brokers, profit would come from the volume of transactions it could process.

"The problem is, in our industry, there's no way to predict the transaction volume," says Jon Adler, vice-president of telecommunications at Schwab. "At a moment's notice, volume can double or triple."

To contend with service demands, the firm decided to devise an interactive voice response application to handle the variable volume at a reasonable cost.

The solution, TeleBroker, combines AT&T's Megacom 800 service with AT&T's Conversant voice response units to create an interactive system that provides users with securities data and records their stock transactions.

Schwab has earned honorable mention in *Network World's* User Excellence Awards for the development of TeleBroker and for implementing an application that, in two years, has grown to

The Charles Schwab Corporation

handle more than half of the firm's inbound voice traffic and 20% of its revenue transactions.

"It's easier to have an investment in hardware/software than in people for the 10% of the time when our volume doubles or triples," Adler says.

The application handles about 80,000 calls each day, but usage can balloon. "The biggest day we've ever seen was 160,000 calls," he says. TeleBroker was up to the challenge. It can handle a quarter of a million calls daily, or 20,000 to 30,000 calls at a time.

Using TeleBroker, the customer dials an 800 number and connects to one of three voice response units located throughout the country. The integrated voice response system presents a menu of options. Among other things, the user can get securities quotes, enter a trade and check on a portfolio value. The person can also transfer to a broker if they prefer.

The application uses advanced 800-service capabilities to balance the traffic between the three Conversant sites: San Francisco, New York and St. Louis. Schwab developed the software, but the

hardware belongs to AT&T, which charges a per-transaction fee for its use. The Conversant hardware is linked via a Schwab's IBM Systems Network Architecture net to a Hitachi America, Ltd. mainframe in San Francisco. The backup is an IBM host in New York.

Despite offering a 10% discount for automated TeleBroker transactions, people making larger trades still prefer to work with a broker. "But when it gets really busy here, there's much higher [TeleBroker] usage as a mix of total traffic," says Adler. "There is a subset of people who will go to TeleBroker in a pinch, people willing to tolerate automation when there's a delay involved otherwise."

TeleBroker has been more successful than Schwab had expected. When the company put the proposal together, they thought 10,000 calls a day after two years would mean a successful implementation. "It's grown faster than we could have imagined," Adler says. The company saw a return on its investment within one year.

"Maybe it's the ATM generation," he says. "But there seems to be a large desire to use this kind of technology."

— *Jerry Lazar*

Calling Avon

The familiar doorbell-ringing Avon Products, Inc. representative is being brought into the 1990s. In addition to carrying sample cases of cosmetics, toiletries and gift items, some sales representatives now carry hand-held computer terminals.

The Portable Order Entry Terminal (POET) eliminates virtually all paper from the ordering process. Sales representatives enter order data into the terminal and then use a standard RJ-11 telephone connection and AT&T's 800 services to dial into one of two AT&T Conversant voice response units at Avon's Rye, N.Y., headquarters.

For encouraging development of a system that combines both voice and data transmissions from remote users, as well as for placing state-of-the-art technology in the hands of a relatively low-technology work force, Avon has been awarded honorable mention in *Network World's* User Excellence Awards.

Sales representatives dialing into the company's network are greeted in voice mode by the Conversant voice response units, which lead callers through several voice prompts and on-screen messages before cutting over to data mode and letting remote users upload orders.

After the order data is sent, the system, in use since January,

switches back to voice mode to send error messages and to confirm the order. The voice response unit then uploads the data to Avon's host computer on-site.

Not all of Avon's 500,000 salespeople use POET. Its use has been limited to about 20,000 — less than 5% — of Avon's top salespeople. The terminals, for which the reps pay a nominal monthly fee, are offered to top sellers, says to Robert Hughes, manager of telecommunications at Avon. "It's an incentive. They feel good about it because it represents a commitment. They feel more professional because it is a professional tool."

By giving the terminals only to the best salespeople, Avon is getting more productivity out of the top 4% of its sales force. The improvement comes from the increased speed of order entry.

Before POET, sales reps would prepare a paper-based purchase order on a booklet-length form, Hughes says. They would then mail the purchase order to their local Avon branch, where it would be scanned into the network and processed.

POET eliminates the mailing entirely and allows sales representatives to sell for three to four days more in a two-week sales cycle, rather than stopping early to

file the written orders. This translates into a 5% to 10% increase in sales, according to Hughes.

Avon began developing the system's specifications in 1990, and they were provided to IBM and, later, AT&T. AT&T developed POET's telecommunications software within two to three months, says Steve Cafiero, AT&T's national account manager. "Avon approached me, saying they had a project dubbed POET," he recalls. "They needed a quick turnaround and an answer on what AT&T could provide."

The hardware wasn't a problem, but it took some research and custom design to come up with software that would combine voice and data on the same call.

The result was "a real showpiece," Cafiero says. POET was completed in November 1991 and put into use two months later. Avon, however, owns the source code for the software, Cafiero says somewhat regretfully.

Avon is more than pleased with the results of the POET project, Hughes says. The system was designed modularly and can theoretically support any number of users. Avon intends to arm half of its sales force — 250,000 users — with the POET devices in the next two to three years.

— *Jerry Lazar*

Redundant redundancy

In order to build the B-2 Stealth bomber and the F/A-18 fighter plane, Northrop Corp. must move huge amounts of data between engineers, designers and technicians. The data has to move across the net quickly, securely and, above all, reliably.

To meet these requirements, Northrop added two extensive Fiber Distributed Data Interface networks to its nationwide 30,000-user corporate net. While

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A unique aspect of the IMPCA+ net is integrated fiber-optic cabling.

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FDDI includes an inherent layer of redundancy, Northrop took no chances in its network design and built in a second level of redundancy to both nets.

For its unique FDDI network design, Northrop has been awarded an honorable mention in *Network World's* User Excellence Awards.

The first FDDI net, built to support the manufacturing of the B-2

NORTHROP

bomber in Palm Dale, Calif., is the result of an Air Force contract to build a "factory of the future." The goal is to make the manufacturing floor a paperless environment, said Rob Goldberg, principal technologist for Northrop Telecommunications Technology group.

Northrop developed the Palm Dale FDDI net as part of an overall project dubbed Integrated Manufacturing Planning and Control for Assembly (IMPCA+).

In the network, workstations are connected to fiber-based Ethernet or token-ring segments that feed traffic into one of 30 Ethernet and token-ring concentrators, which, in turn, feed data to 12 Cisco System, Inc. routers.

Those routers are linked to four SynOptics Communications, Inc. FDDI concentrators that are linked together to form an FDDI backbone, which inherently supports a dual-ring architecture that enables data to continue flowing if one rings goes down.

Northrop achieved the extra layer of fault tolerance using a configuration called dual homing, in which each router connects to two concentrators on the

backbone ring, thereby having a hot standby link to the backbone.

The redundancy extends throughout the network, according to Goldberg. In addition to dual homing, the network uses the related configuration of dual pathing, in which each LAN is connected to two routers. In some cases, workstations and servers have two network adapters and connect to different Ethernet or token-ring segments.

One result of dual pathing is what Goldberg refers to as 50% capacity redundancy. Each router has all of its ports connected to LANs, but only half are in use at any time. The network load is balanced so that if one router goes down, another picks up its connections without a noticeable degradation in performance, he says.

A unique aspect of the IMPCA+ net is integrated fiber-optic cabling and power distribution, Goldberg says. Fiber-optic cabling and power lines were pulled through the building together and terminated in the same outlet box so that each wall plate has a fiber-optic plug as well as power outlets.

"We saved approximately 50% on installation costs," Goldberg says.

The second Northrop net is called the F/A-18 Fighter/Attack Plane Support Network and is in Hawthorne, Calif., where the F/A-18 is built. It also is a dual-homed FDDI net that links Ethernet and token-ring segments to mainframes five kilometers away. The network uses four SynOptics FDDI concentrators to form the backbone in addition to 15 3Com Corp. routers. The F/A-18 net can handle a 50% FDDI

The F/A-18 net can handle a 50% FDDI equipment failure without disruption.

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equipment failure without disruption, Goldberg says.

There are two significant differences between the IMPCA+ and F/A-18 nets. The F/A-18 net does not include integrated fiber-optic and power cables at the wall plate. Instead, it uses Level 5 unshielded twisted-pair wiring to link workstations to a concentrator. The unshielded twisted-pair wiring is in anticipation of supporting FDDI over copper, Goldberg says. ⚡

— *Eric Smalley*

CEO's vision becomes business reality

to press only one key to toggle between LAN and mainframe applications. As soon as they hit this hot key, their session is waiting for them, always open.

The success of any network depends to a large degree on the applications that run over it. "This whole network was really designed and geared toward a whole portfolio of applications," says Leo Gilmore, director of systems development.

Because many of the work processes at MCD were paper-based, most of its employees had little or no experience with

> "We look on information services as an investment, an asset for our organization both currently and in the future."
>
> ▲▲▲
>
> **Allen Johnson**
> President and CEO
> Medical Center of
> Delaware

network computing. MCD decided to peg acceptance of the network on one application — electronic mail.

At the same time, the IS staff began to develop and implement its portfolio of applications, many of which were LAN-based. MCD now uses 39 LAN-based applications, which include a pharmacy management system, operating room (OR) scheduling, a materiels management system, chart tracking, claims processing and invoicing.

The outpatient OR suites at MCD are expensive assets, and MCD needed to be more efficient about the way they booked those rooms. The outpatient OR scheduling system began setting OR usage records as soon as it was implemented.

Other LAN-based applications provided tangible benefits, too, particularly the materiels management system, which reduced inventory from $1.35 million to less than $485,000, saving the medical center more than $800,000. In addition, inventory required less space, decreasing total inventory space from 16,000 to 8,000 square feet.

The system also took the job of "counting bandages" away from nurses and put it where it rightfully belonged — in the hands of workers in the warehouse where MCD keeps its supplies. Finally, the materiels management system allowed MCD to eliminate five full-time and 10 part-time employees, decreasing labor requirements by 13,000 hours per year.

The medical center has implemented several minicomputer-based applications that have increased efficiency, as well. One of the first of these was a VAX-based laboratory information system, which has allowed MCD to increase the number of lab tests performed by 24% without increasing staff. Currently, 95% of all lab results are communicated electronically from lab instruments to the laboratory information system, which generates test reports.

In addition, the system automatically faxes lab test results directly to physicians' offices, allowing doctors to diagnose illness more quickly and efficiently. The medical center has at least two other VAX-based applications — one that oversees operations in the radiology department and another that monitors fetuses.

One of the first mainframe-based applications that MCD brought into play was the Hospital Information System, a major function of which is patient registration. This system runs on MCD's IBM 3090.
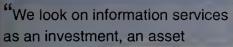
Unlike many hospitals, the patient registration system at MCD is distributed. Patients can walk into almost any department and register. The approach Gilmore used was to turn on the registration system in each department one at a time.

"To train 600 people in registration and admitting and go live in one day was suicide because the noise level and the confusion would have jeopardized careers," Keever says. Still, a couple of large departments such as inpatient had to learn the new electronic registration process all at once; at those times, IS staffers spent 57 hours supervising the workers.
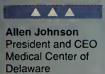
The medical center's IS department has just finished installing another mainframe-based application that is one of its crowning achievements, the Clinical Care System (CCS), an IBM 3090-based application that allows inpatient nurses to track the care each patient receives. Using a light pen and a workstation, nurses build patient care plans, which are basically game plans for how to care for patients, as well as track doctors' orders regarding patients. There are 12 such workstations installed in each nursing unit.

While the accounting system at MCD is

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already linked to the CCS and to other ancillary departments, the IS department is currently in the process of installing links between the CCS and many of the other applications used in the medical center, such as radiology, laboratory and pharmacy. These links will allow the nurses to use the CCS to generate orders for such things as lab work and drugs to be administered. MCD plans to put these links in place one by one over the next year.

One major benefit of the CCS has been a reduction in the time required for nurses to hand off patient care during shift changes. The CCS has also given the nurses a greater sense of the big picture regarding each patient and a greater understanding of the final result of the care they give.

Because it is so much easier to use, nurses have found that it has increased their use of care plans from about 70% to 100%. And it has facilitated the process of transferring patients from one unit to another.

The ultimate goal is to provide a centralized record of all information regarding the demographics of patients and of

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MCD's network is poised to make all information accessible.

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the care, treatments and procedures patients undergo. Working toward that goal, MCD has implemented the concept of a Master Patient Index (MPI), a record that is created at registration and follows the patient throughout the hospital. Once all the applications at MCD are linked, the MPI will contain a thorough record of the patient's stay at the hospital.

Implementation of a new mainframe-based Patient Accounting System has allowed the medical center to eliminate three redundant billing systems used for inpatient, outpatient and emergency room encounters.

Here again, the concept of the MPI came into play. "There was no vision originally to recognize that you needed a common MPI," says Gilmore. "Therefore, they just grew out of a 'What's next?' kind of attitude." The outstanding balance of bills is now paid off within an average of 60 days rather than 117 days. This translates into reducing the accounts receivables balance by $39 million.

In addition to the redundant systems, MCD's billing was out of control. One problem was that technicians working in the lab were focused on communicating the results of tests, not on the annoying task of filling out the piece of paper that would tell the billing system to charge the patient.

"We found departments that didn't know they had to charge," Gilmore says. According to George Brenckle, manager of clinical information systems, the new billing system, with its electronic links to other systems, "removes the need for the people in the lab to think about [that]."

The Laboratory Information System now automatically sends a record of work done to the Patient Accounting System.

"There were some places where we as a company were just hemorrhaging — billing — and so we really had to step up and address that issue," Keever says.

Looking to the future
Like all networks, the network at MCD is in a constant state of flux, with changes geared toward making CEO Johnson's vision of instant access to patient data come true. In today's hospitals, especially in departments such as the emergency room, no one has immediate electronic access to the information doctors keep on patients' history of health care or treatment, according to Johnson. In addition, physicians have no electronic access to information about what care was given to their patients in the emergency room.
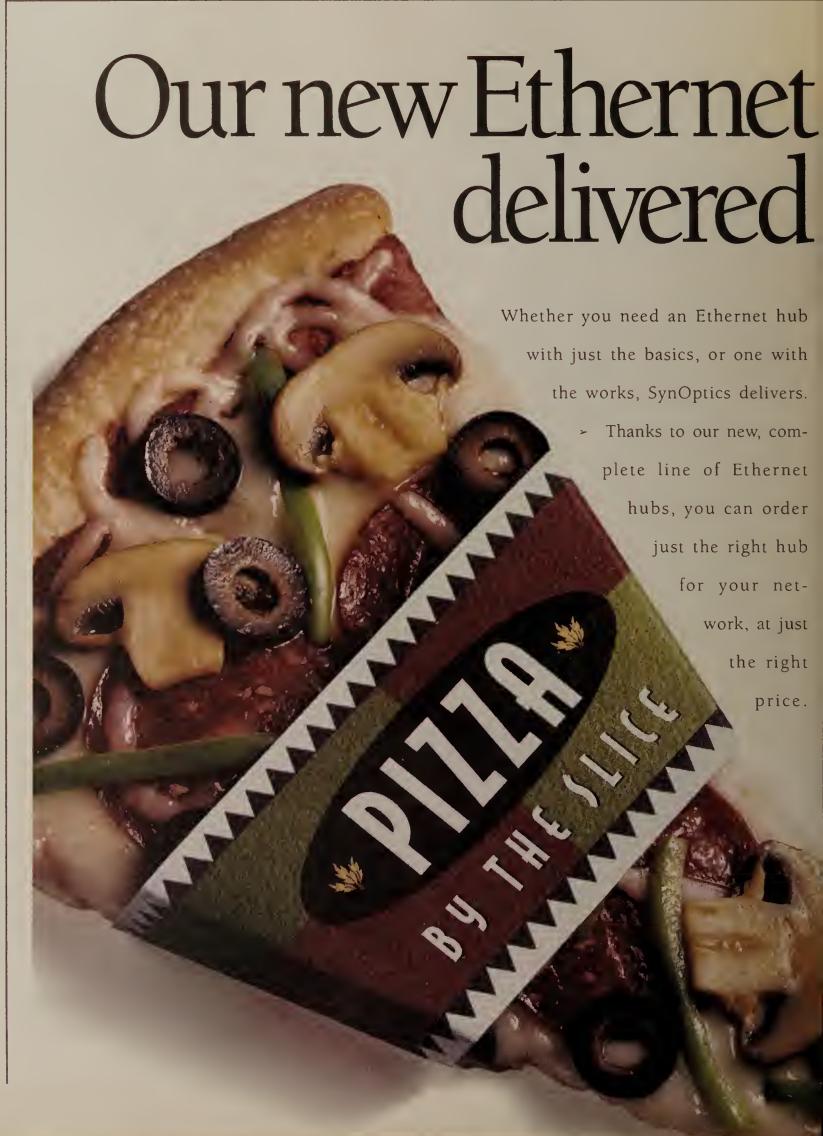
MCD's network is poised to make all information accessible as a value-added service. "We really see our role as being a prime advocate for cost-effective, high-quality care in this community in a cooperative, collaborative way," Johnson says.

The medical center's IS staff is now forming its next five-year plan, which includes implementing what they call the Delaware Regional Application in order to reach physicians, businesses and clinics in the region. The past five years' network activity has supported these plans, and the next five will see them come to fruition. "We're finding that our vision was more accurate and more focused than we realized at the time," Johnson says. **Z**

Conliffe is an associate features editor at Network World.

Our new Ethernet delivered

Lotus intros cc:Mail that's object-based

icons for accessing commonly used functions such as printing.

Users can also click on individual messages in the inbox or mail folders and bring them up to the desktop.

By clicking another time, users can bring up the messages in a separate window. Each message object has a live link back to the cc:Mail application, allowing users to reply to or forward messages in the same way as they would within the cc:Mail inbox.

The cc:Mail for OS/2 Workplace Shell also has a tool called the Message Template Object (MTO), which makes it quicker for users to send messages to a pre-addressed list of recipients.

Users fill out the MTO with names and addresses to forward the message to, specify the time of delivery and add text to be included in the message. They can then drag and drop a file or document from another OS/2 application onto the MTO on the desktop. This triggers the delivery of the message to all defined recipients.

Also, users can send messages from within any OS/2 file by pulling down the OS/2 context menu and clicking on an item called cc:Mail-It. This opens up a new message and automatically attaches the file to the message.

The cc:Mail for OS/2 Workplace Shell also allows users to write scripts that automate mail-handling functions.

The new version of cc:Mail will be available in 90 days. Pricing will be comparable to other versions of cc:Mail, which cost $495, Wong said. ▱

Long-haul carriers plot wireless paths

based on the fact that all three carriers are showing an interest in wireless technology, said Berge Ayvazian, vice-president of communication research at The Yankee Group, a market research firm in Boston.

Their efforts should increase competition in the local loop, which should result in lower prices on long-haul and local services, Ayvazian said. Long-haul carriers will be able to reduce the hefty access fees they pay to local carriers as wireless carriers are used more for this access.

Also, the very fact that more players will be participating in the local loop as PCS nets emerge will drive down local loop prices, he added. "The carriers are looking to use this fast growing technology to gain traffic on their long-distance nets to grow market share," Ayvazian said. "But users will benefit."

The involvement of the long-haul carriers in the wireless market should also help users because the long-haul carriers are more sophisticated about data services than the local carriers are, Held said. That should result in wireless data services becoming ubiquitous sooner, he said. ▱

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Fed Ex showcases apps at Comdex/Fall

agents. It consists of a PC and software Federal Express offers customers that generate more than $75 worth of business a day. The system generates shipping labels, tracks the destination and cost of every package sent on a given day, creates management reports such as those on shipping trends, and also gives them a dial-up capability to enter Federal Express' internal database to track individual packages.

The three applications add up to a powerful customer service tool for Federal Express.

"As we move into the '90s, there's a lot of interest in what all this technology really buys us," Jones said. "We hope to show that it's a lot." ▱

Dealing with users' rising expectations

system more frequently and become impatient with such repair lags. This means you will have to contract for a more comprehensive maintenance plan, one that allows for faster repairs. This user expectation will significantly increase your operating expenses, and theirs.

In the end, rising expectations often seem to offer nothing for the network manager but relentless demand for faster, better and less expensive service. It also means that the better you perform, the higher you raise the stick by which you are measured.

Yet, look on the bright side. Without it, we would lack one of the most compelling pressures for continuous improvement. ▱

Schmall is the director of telecommunications at an insurance holding company.

AT&T may pull Integrator off mart

continued from page 1

"No one company has the resources necessary to anticipate all of the features and functionality required in a [manager of managers]," said Dave Passmore, vice-president and service director at Gartner Group, Inc. in Stamford, Conn. "It is a bankrupt model."

BT earlier this year pulled Concert off the market, opting to offer its functionality as a service to customers.

AT&T is now in discussions with current customers to determine what impact pulling Integrator from the market will have on them.

Bill Gilbert, AT&T's director of network management, said AT&T will decide Integrator's fate after those meetings with users. He acknowledged that Integrator is not providing a return on investment.

"The number of customers and what they are willing to pay don't support the cost of being in the business," he said.

AT&T would not disclose the number of Integrator users, but figures from various

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$\mathbf{A}$nalysts said open management platforms, such as HP's, are proving more viable.

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market researchers range from as few as a dozen to as many as 200, including AT&T internal customers and field-testing sites.

Gilbert said users are opting for carrier-provided management services instead of governing their networks themselves using products such as Integrator. AT&T personnel use Integrator to manage customer nets as part of AT&T's Accumaster Management Services offering.

Some observers said Integrator's market did not materialize because the product is a voice-oriented management system that failed to generate interest among application developers.

"They've been focusing more on the capabilities for voice management," said Kelsey Hill, vice-president of corporate telecommunications at Marriott Corp. in Washington, D.C. "They've probably been focusing in the wrong area."

Hill said his company recently issued a request for proposal seeking an integrated management solution for its enterprise network. AT&T did not pitch Integrator or any other management product in its portfolio. Instead, it offered to finance, integrate and support any other product Marriott chose.

Another user said he has also heard rumblings about Integrator's demise. "I heard from other carriers that [AT&T] wanted to stop development," said Les Wright, manager of corporate networking and network applications at General Dynamics Corp. in Fort Worth, Texas. "But I have not received any answer of substance [from AT&T]."

If AT&T decides to pull Integrator from

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the market, it may substitute NCR's StarSentry network and systems manager. StarSentry, which is an OEM product manufactured by NetLabs, Inc. of Los Altos, Calif., supports standards such as the Simple Network Management Protocol. NCR also recently disclosed that StarSentry will support the Open Software Foundation, Inc.'s Distributed Management Environment (DME).

StarSentry, currently tailored for data network management, will have to inherit voice management capabilities, however.

But AT&T's competitors say the company is not putting all its eggs in the StarSentry basket.

"They are talking to HP to have OpenView be part of their [end-user] solution," said Duncan Campbell, marketing manager in HP's Colorado Networks Division. OpenView also supports SNMP and DME interfaces and has garnered widespread support among application developers.
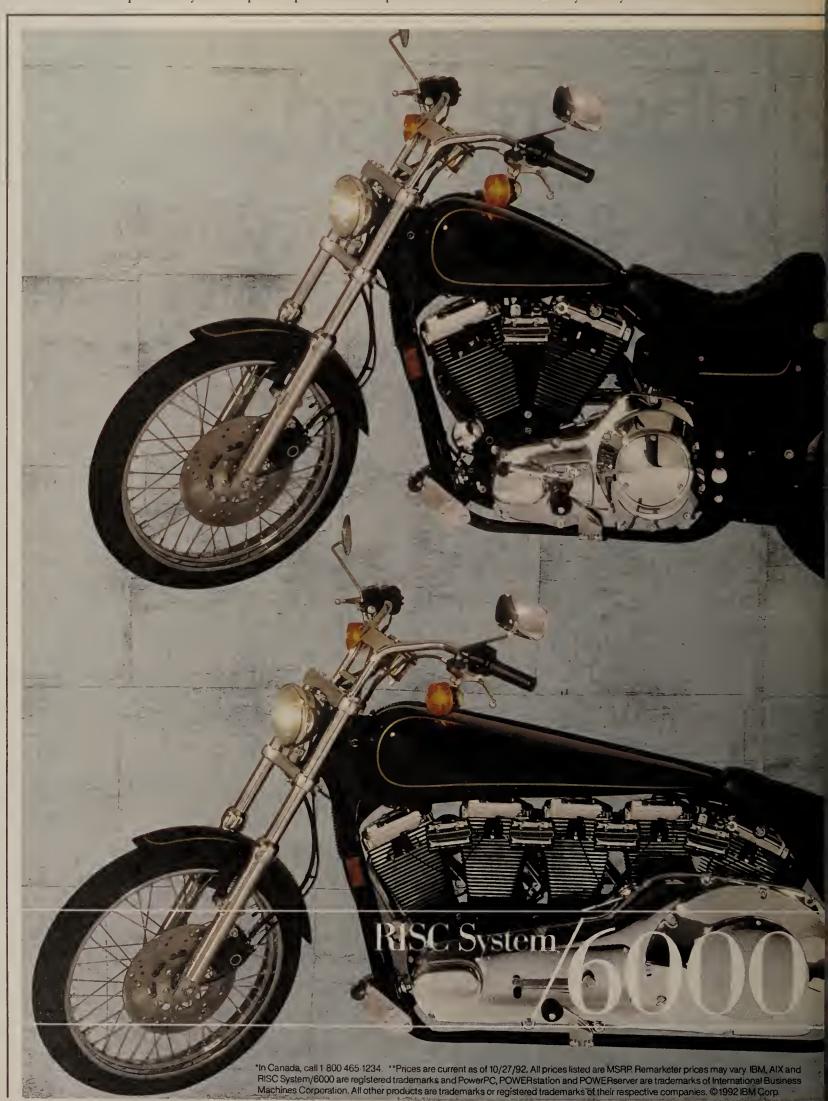
Campbell would not elaborate. AT&T's Gilbert said the company is evaluating adding OpenView to its stable of services but he is not aware of any plans to offer an OpenView-based product for end users. ∎

IETF scrutinizes fixes for Internet woes

continued from page 6

research group at Bell Communications Research, during his PIP presentation. "The question is, Is it worth the wait?"

Internet users in attendance didn't seem to think so. "PIP basically removed itself from the race," said Craig Partridge, an Internet user and research scientist at Bolt Beranek and Newman, Inc. "We can't afford to wait a year to see if something may or may not work."

RISC System/6000

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A second proposal, IPAE, which provides larger addresses and uses current IP protocols, is being positioned as a transition step to the new IP — SIP. Regardless of SIP's fate, IPAE may be chosen as an interim solution if users become gridlocked over a long-term answer to the addressing problem.

"IPAE is trying to protect the installed base and provide a transition to the new IP so the IETF can concentrate on the migration issues," said Sun Microsystems, Inc.'s Bob Hinden. "We can start deploying this within the year, giving us a solid founda-tion to keep the Internet up and running while the new IP is installed."

The real battle seems to be between Tuba and SIP.

SIP eliminates some fields and restructures others within the current IP addressing scheme, thereby allowing larger addresses to be used without increasing the size of the address header.

SIP would not only resolve the address shortage problem, but would provide performance gains. For example, in the current version of IP, each router has to check the source routing address of every packet that comes through it. That is not required in SIP, which allows packets to travel more quickly through the network.

Tuba, which is based on the Open Systems Interconnection CLNP, provides larger addresses and uses the current architecture and protocols of the Internet.

Adoption of Tuba would mean users would still be using TCP but running it over CLNP instead of IP. Because there are few differences between CLNP and IP, a transition to Tuba would be quick and relatively painless, said Peter Ford, a staff member in the computer network engineering group at Los Alamos National Laboratory in New Mexico.

"If you want the minimum amount of change with no new benefits, you'll support Tuba, but if you're looking for better performance, more features and something new, you'll jump on the SIP bandwagon," Partridge said.

No formal decisions were made last week about SIP and Tuba, an indication that users are still divided over which direction to take.

Gross said IETF hopes to narrow the field of candidates, establish selection criteria and provide feedback on the proposals before the next meeting in March, when it hopes to arrive at a final decision. ◪

Regulatory Update

MCI's 800 MultiManager will pull together the different vertical features available, along with pricing information from the various local carriers. In January, it will set up a customer support center and a new capability that will allow customers to split 800 traffic between long-distance carriers.

In addition to helping users sort through the vertical features, MCI will also help users develop plans for redundancy and disaster backup of 800 service using multiple carriers, said Dawn Clark, director of 800 services at MCI. She said MCI will announce pricing for the service after the local carriers file tariffs for vertical features.
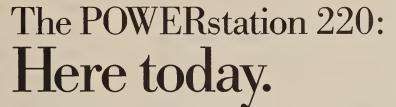
Northern Telecom, Inc. last week announced it has entered into a joint venture with two divisions of China's Ministry of Posts and Telecommunications — the **China International Telecommunications Construction Corp. (CITCC)** and the **Xian Institute of Posts and Communications.**

The new unit, Posts and Telecommunications-Nortel Technical Corp. (PNT), will provide the high technology skills and continuing network support service that will enable the growth and expansion of China's digital telecommunications network in the 1990s and beyond.

The total investment in PNT is $6.25 million, including $1.15 million by CITCC, which has 18.4% ownership of the unit, and $1.35 million by Xian for a 21.5% stake of the venture. Northern Telecom will invest $3.75 million for a 60% ownership of PNT.

PNT plans next year to add a SuperNode with an Enhanced Network, common channel Signaling System 7 equipment, a DMS-100 central office switch and peripheral equipment extensions. PNT will also add network engineering and telecommunications management courses.

AT&T Network Systems last week announced it had been awarded a $7.5 million contract for the initial phase of the first national fiber-optic network to be installed in Venezuela. AT&T's portion of the contract was awarded by Venezuela's telephone company, CANTV. It will link Caracas with Valencia, Guarenas and Guatire. The AT&T cable will cover 136 miles and will be able to carry as many as 135,000 simultaneous telephone calls. ◪

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Fannie Mae shows off net

Fannie Mae has already come a long way with ISDN since it joined McDonald's Corp., Tenneco Corp., the Commonwealth of Virginia and Lawrence Livermore National Laboratory in the first wave of ISDN users in 1988. Currently, Fannie Mae's two buildings here use more than 1,500 ISDN BRI lines from Bell Atlantic Corp.

And Fannie Mae has wider plans for BRI, which has the inside track over frame relay and Switched Multimegabit Data Service as a means of letting more than 10,000 customers, and maybe telecommuters, access its data net with personal computers.

This aspect of the ISDN project may begin as early as 1994.

Fannie Mae's regional offices in Atlanta, Chicago, Dallas, Philadelphia and Pasadena, Calif., are served by AT&T 5ESS switches, which lets the company enjoy a package of advanced features that are not yet supported by oth-

PHOTO ©1992 WALTER CALAHAN
Potential ISDN users view live ISDN applications at TRIP '92.

er switch makers and not yet included in a national ISDN specification.

"Having all the offices served by [5ESSs] means we can ride the crest of the wave rather than trying to keep up," Logan said.

Meanwhile, Fannie Mae is doing everything it can to promote ISDN. "We're very pleased with the [demonstration's] turnout," said Lari Sue Taylor, a telecommunications consultant with Fannie Mae. "And we've had lots of calls from users that heard of the open house and want to visit." ∎

Firms team to offer connectivity

however, Host.FTAM also needs to use the NPSI/GATE software in a FEP to access X.25 nets.

That's where the McData box comes in. The LinkMaster 6200 is an IBM 3172 Interconnect Controller-compatible box that can be channel-attached to a mainframe and support token-ring, Ethernet or Fiber Distributed Data Interface local-area nets.

The McData-Proginet software driver interface would run on the McData box and enable the 6200 to take Host.FTAM data, send it across the token-ring, Ethernet or FDDI LAN to a bridge or router linked to an X.25 net. The 6200 does not support X.25 directly.

McData said it expects the interface will be ready by June or July of 1993.

The goal of the McData-Proginet alliance is to give users access to wide-area networks without having to go through a front-end processor, said James Kelly, Proginet's vice-president of engineering. This should improve the performance of the OSI file transfer. Neither company was willing to define how much performance would be improved.

Analysts said the McData-Proginet alliance would be important to banking, government

> The McData-Proginet alliance would be important to banking and government users.
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and European users who have begun implementing OSI products in their nets.

"We think the new interface on the 6200 combined with Host.FTAM will give users more of a choice in selecting OSI products and applications," said Jamie Zartman, senior business planner for McData. ∎

Court bashes FCC on rules

munications Corp. and Sprint Corp. — will now have to file tariffs for all services, including custom network deals.

A handful of the largest carriers already file tariffs for standard offerings, but even MCI and Sprint do not file tariffs for custom deals or services, such as frame relay and Switched Multimegabit Data Service.

Although users complain that uncloaking custom net contracts will aid corporate rivals, making such information public should give users leverage when negotiating new deals.

But it could also increase lead times for new services since all deals will have to go through regulatory scrutiny. Users will also have to determine what changes, if any, must be made to their deals in order to be in compliance with the order.

It is unclear whether providers of interstate access will have to file tariffs, but in response to the order, Bell Atlantic Corp. asked the FCC to impose such a requirement. If all long-distance and local carriers have to file tariffs, it would require the FCC's already overloaded resources to examine hundreds of new tariffs.

It is also unclear whether AT&T's Tariff 12 filings and contract deals are sufficient to meet tariffing requirements, according to James Spurlock, special assistant to Cheryl Tritt, FCC Common Carrier bureau chief.

The Communications Act of 1934 requires carriers to file tariffs listing charges for their offerings. Under Tariff 12 and contract deals, rates are filed for switched voice, but individual rates for private lines, data services, net management, and routing and billing options are not listed. Those charges are included in a broad basic charge.

Joe Nacchio, president of Business Communications Services at AT&T, said he thinks that both Tariff 12 and contract deals meet tariff requirements. However, he acknowledged that rivals might try to challenge their validity.

FCC officials say they have not yet sorted out when carriers should file tariffs and what information must be in them. "We are telling people for the time being if they want to file tariffs, do it on a voluntary basis," Spurlock said. "In effect, the [carriers] are on their own. We can't give them any legal advice on what to do on a court order that's very unclear."

But Nacchio says he thinks the court order requires carriers to file tariffs immediately. "If I lose any [business] going forward and there's no tariff [for the rival's service], we will be in the [appeals] court asking for a cease and desist order," he said. He added that AT&T will pursue damage claims against other carriers operating without tariffs.

The court instructed the FCC to reopen an investigation into whether AT&T should be compensated for business lost due to rivals' nontariffed deals now ruled illegal. Nacchio said that the statute of limitations for such damage claims is two years, so he is considering whether to file damage claims for all custom deals lost during that time.

The most pressing concern for users now is whether their deals must be filed as tariffs to comply with the court order and, if so, how to make sure that happens. James Blaszak, a telecommunications attorney here who counsels numerous corporate customers, said he is advising his clients to review their contracts to see if they have a provision that requires the carrier to file the deals as tariffs if necessary. If so, the users are probably protected.

If users do not have such a provision, they should contact their carrier. Either way, users should not be concerned about liability for deals judged illegal, Blaszak said. "I don't think users are liable for any damages, but it seems carriers would be subject to damages for any future deals done off-tariff," he said.

A bigger concern in Blaszak's mind is the disruption the order will cause. "I think that in the long run, the decision [to reimpose regulations] holds the potential for significantly reducing competition," he said. "In the short run, it's going to chill the marketplace and create chaos for customers that have off-tariff deals with AT&T's competitors."

MCI and Sprint last week said they are disappointed by the ruling. But Gary Parsons, senior vice-president of corporate and public policy at MCI, said he does not expect it to hamper MCI's ability to compete. He added that MCI's contract deals can easily be tariffed if necessary. ∎

Unforeseen problems that can put the bite on your network

X terminals give user a fitful experience

By TOM BARRETT

At first glance, converting from an old-fashioned RS-232/VT-100 style network to a more modern Ethernet-based X terminal configuration may appear to be a seemingly simple task, but as I found out, it can be quite a challenge.

About six months ago, we began installing X terminals at Pacific Bell for our field users.

X terminals are substantially different from the previous generation of video display terminals — both in terms of the software that drives them and the hardware and networks that connect to them.

Either of these factors can be serious stumbling blocks in the course of any X terminal installation.

Because X terminals contain much more intelligence than dumb terminals, they have to boot either from an onboard programmable read-only memory or from code downloaded from another machine.

In our case, we ran up against three problems:
■ The way in which X terminals authenticate logon attempts.
■ Differences in how X terminals and workstations on the net interpret commands.
■ Issues in downloading fonts within the X terminal environment.

When we had our Ethernet installed and plugged in our first X terminal, a Network Computing Devices, Inc. (NCD) 19c, it booted correctly and came up with a logon screen. This was no surprise as we had already tested the X terminals extensively at our development facility in northern California.

Unfortunately, it soon became apparent that no one could log on to our new X terminal unless they used the systems administrator's super-user or root logon.

Half a day of heavy-duty debugging and examination of log files revealed that the X terminal was not accepting valid passwords, except for those associated with the root logon.

How could this be? An hour or so on the phone with NCD technical support cleared up the mystery: X terminal logons are handled by the X Display Manager (XDM), which uses a different password validation process than the standard Unix logon program.

For security reasons, the Unix operating system provides a mechanism for password aging. This password aging is denoted by special characters, which appear directly after the encrypted password in the Unix password file. Unfortunately, the XDM process considers these aging characters to be part of the password and will not match any password that is aged. Want to guess which password was not aged? That's right, the root logon password.

When we finally had our new toy functioning, we were so busy playing with it, we failed to notice that the network's Sun Microsystems, Inc. SPARCserver console had locked up. The console oversees operation of the SPARCserver. It took a couple of reboots before we realized this behavior was in some way connected with the X terminal session. And we went back to the debugging.

This time, there was no problem with XDM, of course, because XDM had already handed us off to the Open Windows window manager on the SPARCserver. We had a look at the .xsession configuration file to see exactly what

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U nfortunately, it soon became apparent that no one could log on to our new X terminal.

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Open Windows was doing. But there was nothing out of the ordinary — just a couple of xterm terminal emulation windows and a clock.

Once again, we were on the phone to NCD technical support, and once again they found the problem. It was in the options to one of the xterms; we had input a -C, which instructed the X terminal to "behave as a console window." Essentially, we had redirected the SPARCserver console activity to the X terminal. As a result, the SPARCserver's console was frozen.

Another alligator surfaced when we began to experiment with an X terminal at our development facility. This X terminal was set up to boot from a SPARCstation 2 in the cubicle next to it, but I wanted to see if I could get it to boot from our production SPARCserver in Los Angeles. It was a simple task to change the boot parameters in the X terminal's nonvolatile random-access memory. Or so we thought.

The X server code downloaded correctly, but the terminal didn't seem to be able to find any fonts. These are files that X terminals use to display a myriad of different type faces. As a temporary measure, I set the X terminal up to boot from the SPARCserver in Los Angeles, but to use the server in northern California as its font server. For some reason, it had no difficulty at all in downloading fonts from that machine.

Perhaps a word should be said here about how X terminals download code. In general, they use the Unix Trivial File Transfer Protocol (TFTP), which allows for transfer of files by "anonymous" users or machines. Because it is relatively unsecure not to require any sort of authentication, it is common practice for servers to run TFTP in secure mode. This allows non-authenticated access but only to files under the /tftpboot directory. All files required by the X terminal must be under this directory or TFTP will not be able to find them.

This poses a problem, however, because the amount of code necessary to boot an X terminal, set its colors and download its fonts is quite large and there is seldom enough room in the root file system to install this code directly in /tftpboot. It is not unusual for system administrators to install the code in a "roomier" file system and set up appropriate symbolic links — a Unix term for linking files across file systems — to another directory where the files are stored.

On our machine, I set up a symbolic link from the directory /usr/lib/X11/fonts, where I had installed the font files, to /tftpboot/usr/lib/X11/fonts. The rest of the server code was actually physically under /tftpboot. When I tried to boot the X terminal using this configuration, I was surprised to discover that TFTP gave me "access denied" error messages.

I suspected that this error message had something to do with the symbolic link I had made, but I couldn't understand what.
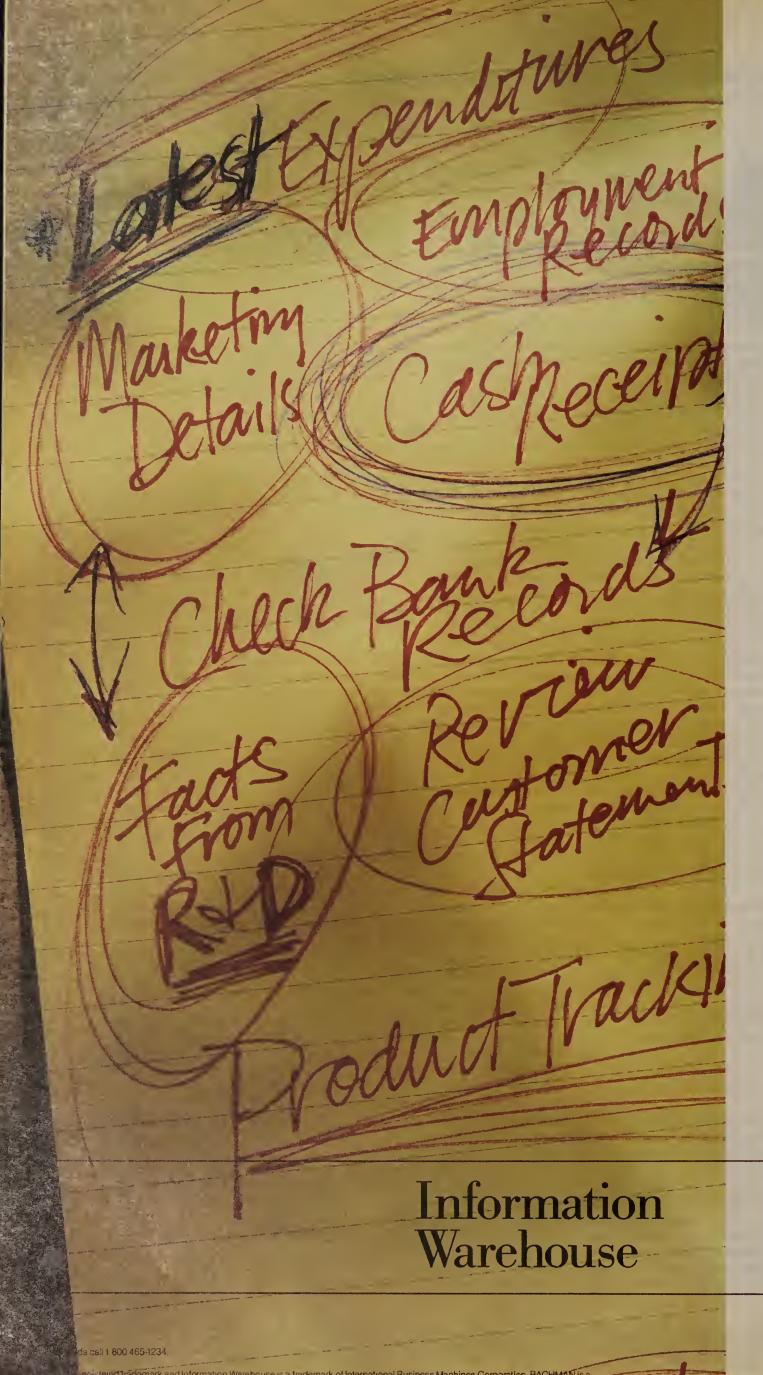
Time for another phone call to NCD. Again, they discovered the problem. The access restrictions placed on secure TFTP have certain ramifications with regard to the structure of the /tftpboot file tree. In particular, while /tftpboot can be a symbolic link to some other location in the file system, no subdirectories of /tftpboot can be symbolic links (unless they are links within the /tftpboot file tree). By linking just my font directories, I was instructing TFTP to download files from outside the /tftpboot file tree, and it was replying, in essence, no dice.

As a result, I relocated all the files in /tftpboot to usr/lib/X11 and set up a symbolic link between these directories. Although this sounds like it may not work, when TFTP attempts to grab code and download it to the X terminal, it grabs all the files from the linked directory and loads them.

I have had my X terminals in for a couple of months now, with no further problems. I've even expanded my production network so I can boot the X terminals from multiple machines, and I've gotten quite good at writing .xsession files. I do wish, though, that there was an easier way to become "X-perienced"!

Barrett is a systems analyst with Pacific Bell.

IT'S HARD TO DRAIN THE SWAMP when those reptiles keep getting in the way. To share your "alligator story," call Susan Collins, associate features editor, at (508) 820-7413 or fax your idea to (508) 820-3467.